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1. Enameled copper plate. 2. Porcelain Vase (Siwen-te, 1426–1436). 3. Painted Screen. 4. Porcelain vase (Ming, 1368–1644). 5. Snuff-jar of green paste. 6. The War-God Kwan-ti, in porcelain. 7. Tea-pot of terra-cotta. 8. Embroidered altar-cloth. 9. Silk embroidery. 10. Hair-pin.

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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw.	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow.	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

ANTHOLOGY, n. *ăn-thŏl'ŏ-jĭ* [Gr. *anthos*, a flower; *logos*, discourse]: a discourse on flowers; a collection or selection of flowers of literature, as of poetry or epigrams. AN'THOLOG'ICAL, a. pert. to. Anthology is the title usually given to a book consisting of an unconnected series of choice thoughts, in prose or verse, generally the latter. Of the collections of this kind made in ancient times, which consisted mostly of epigrammatic poems, the best known are the

Greek Anthologies.—The first Greek A. was compiled by Meleager of Gadara, Syria, about B.C. 60. Three or four others belonging to periods considerably subsequent to the birth of Christ are lost. Now extant are two later collections, one by Constantine Cephalas, 10th c., who borrowed largely from one of the earlier anthologies; and another by Maximus Planudes, a monk of Constantinople, 14th c., who, by his tasteless selection from the A. of Cephalas, rather spoiled than increased the already existing store. The A. of Planudes was first issued in print, Florence, 1494, by a learned Greek, John Lascaris, and for a long time was the only one known. It went through successive editions, and received various improvements. The latest edition (with the Latin version of Grotius, a master-piece of latinity and rapid execution) was commenced by Bosch, 1795, and finished by Lennep, 1822. Meanwhile, Claude Salmasius had discovered in the Heidelberg Library (1606) the only extant manuscript of the older and richer A. of Constantine Cephalas, which he compared with that of Planudes, copying out the poems not found in the latter. During the Thirty Years' War, the Heidelberg manuscript was carried to Rome; but in 1797, after the peace of Tolentino, the French secured possession of it, and brought it to Paris. In 1816, it was returned to Heidelberg. After the important discovery of Salmasius, the work was often mentioned by the name of the Palatinate Manuscript, or the Vaticano-Palatinate. Portions of it were published by Jensius, Leich, Reiske, and Klotz. The entire collection, augmented by fragments of the older poets, and by epigrams found on monuments and in other works, was edited by Brunck, Strasburg, 1776, under the title *Analecta Veterum Poëtarum Græcorum* (Selections from the Old Greek Poets), and later by Jacobs,under the title of *Anthologia Græca, sive Poëtarum Græcorum Lusus ex Recensione Brunckii* (Greek A., or Fugitive Pieces of the Greek Poets, from the Corrected Text of Brunck), 1794–1814, Leipsic. Since then, it has been published variously, in whole or part. It is impossible not to admire these gems. There is a rich variety of poetic life, great delicacy of sentiment, a joyous serenity, and an abundance of wise, true, and humane thoughts. To the poet, it presents graceful images and exquisite conceptions; to the philosopher, maxims of wisdom; to the historian, monumental inscriptions; to the philologist, the most varied forms of an imperishable language.

Latin Anthologies.—In 1573, Scaliger published at Leyden, in imitation of the Greek A., a Latin A., under the title *Catalecta Veterum Poëtarum* (Gatherings from the Old Poets), and Pithöus one at Paris, 1590. A larger collection

was issued at Amsterdam (1759 and 1773) by Peter Burmann the Younger, under the title *Anthologia Veterum Latinorum Epigrammatum et Poëmatum* (A. of Old Latin Epigrams and Poems). In 1869 Alexander Riese brought out the first volume of a better edition of the Latin Anthology (2d ed. 1894), discarding Burmann's arrangement and placing the poems found in MSS. first, the inscriptions following in another volume.

Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject, and sometimes of 'beauties' of their best poets, with biographical notices, in an order either chronological, or according to the countries in which the authors lived.

1. *Arabic Anthologies.*—Abu-Teman published selections from the old Arabic songs before the time of Mohammed, arranged them in ten books, and named the entire collection after the first book, which consisted of war-songs, *Hamâsa*. Another famous A. is the *Divan* of the Hudhailites (an Arabic tribe), an edition of which was published by Kosegarten. Abu'l-Faraj of Ispahan (d. 966) gathered together in his *Kitâb al-aghâni* (Book of Songs), all the ancient Arabic songs down to the first centuries of the Caliphate. It was published by Kosegarten in 1840. Abu'l-Faraj accompanied the work with a minute commentary, which makes it one of the most interesting of the old Arabic literature. But the richest and most complete A. of the later Arabic poesy is *Yatimat al-dahr* (the Pearl of the World), by Taalebi, in which the writers are arranged according to the provinces in which they lived. It has been continued and enlarged since the period of the original compiler.

2. *Persian Anthologies.*—In the Persian literature, the best known works of this sort are *Taskarat al Shuara* (Lives of the Poets), by Daulet Shah (d. 1495), the contents of which are to be found almost entire in Hammer's work on Persian *belles-lettres* (Vienna, 1818), and *Atesh Kedah* (the Fire Temple), by Haje-Lutf-Ali-Beg, who lived about 1770. Both works give biographical notices of the Persian poets: the first, in chronological order; the second, in topographical order, with specimens from their works. An A. of the best Persian poetry, arranged according to the subjects, is given in the *Medshua al Shuara* (a Collection of Poets).

3. *Tatar Anthologies.*—Of the poets who have written in the Tatar—i.e., the East Turkish or Tshagatai dialect—we possess a collection comprising 441 biographies, with specimens of their poetry: *Madshalis alnasais* (Charming Company), by Mir-Alischir (d. 1500), and the *Lives of the Tatar Poets*, by Sadiki, extending down to the 17th c.

4. *Turkish Anthologies.*—The number of anthologies in the West Turkish, generally called the Turkish language, is very numerous. The most famous are—*Hesht Behesht* (the Eight Paradises), by Sehi of Adrianople (d. 1548); *Taskarat al Shuara* (Lives of the Poets), by Latifi (d. 1582), and, under the same title, a similar work of Ashik Tshelebi

(d. 1571); and the great collection, *Subdat al-ashaar* (the Blossoms of Poetry), by Kassade (d. 1621). The substance of these anthologies is to be found in Hammer's *History of West Turkish Poetry* (Pesth, 1836).

5. *Indian Anthologies.*— The literature of the Mohammedan population of Hindustan, which is a mere copy of Persian literature, has also several anthologies. The most important are - *Gulzari Ibrahim*, by Ali Ibrahim, containing biographical notices of 300 Hindustani poets, with specimens of their writings; the collection called *Diwani Iihan*, by Beni-Narâyan; *Guldastai Nishât* (Garland of Pleasure), by Manu Lal (Calcutta, 1836); and *Guldastai Nâzninân*, by Kerim-ed-din (Calcutta, 1845). The substance of these works is to be found in Garcin de Tassy's *Histoire de la Littérature Hindui et Hindustani* (Paris, 1839–47), which, under the title of *Tabakâti Shuarâi Hindi*, was translated into Hindustani by Kerim-ed-din (Delhi, 1848). In the pure Hindi, we have a rich collection of songs, the *Râgd Sâgar*, by Krishnânanda (Calcutta, 1845).

6. *Sanscrit Anthologies.*—The Sanscrit literature is not so rich in anthologies as the other oriental literatures. If we do not consider the Vedic hymns, and the collections of poems which bear the general title *Sataka* (A Century), anthological in the proper sense, there is only one work of this kind known—viz., the *Paddhati*, by Sarngadhara, towards the close of the 14th c., in which are gathered together 6,000 detached strophes of the most famous epic, lyric, and dramatic poets of India, arranged under certain heads.

7. *Chinese Anthologies.*—From the earliest ages, the Chinese had the custom of sending, with the yearly tribute to the emperor, copies of such songs as had acquired popularity. Confucius selected from a great number of these 311 of the most beautiful. These are preserved under the name *Shi-king* (Book of Songs), one of the canonical books of the Chinese. This is the oldest A. in the world. A Latin version, by Lacharme, was pub. Stuttgart, 1830; a German one, by Rückert, Altona, 1833. Besides this, there is *Tchao-ming-wen-siouen*, a collection of the finest poems of the time of the Liang dynasty (A.D. 502–556), and also *Thang-shi*, poems of the time of the Thang dynasty (618–914).

ANTHON, *ăn'thon*, CHARLES, LL.D: 1797–1867, Jul. 29; b. New York: well-known editor of classics. He graduated from Columbia Coll. at the age of 18, studied law in his brother's office, and was admitted to the bar of the Supreme Court of N. Y., 1819. His time, however, was given chiefly to classical literature; and in 1820 he was appointed adjunct Prof. of Languages in Columbia Coll., which office he held for 15 years. His series of classical publications did much to make available for popular purposes the erudite researches of European scholars. His first work was a new edition of Lempriere's *Classical Dictionary*, almost immediately re-issued in England. In 1830, appeared his larger edition of Horace, quite a novelty, on account of the superabundant English notes which accompanied the text. In 1833, he issued a smaller edition, for the use of schools and

colleges. Virgil, Cæsar, and other ancient writers have been illustrated in the same attractive manner. A.'s editions of the classics have been very popular, but scholars regard them with a kind of learned aversion, both because of the temptations which they present to the learner to overlook the difficulties of a knotty passage, and of the superfluous and often unimportant matter dignified with the title of 'commentary' or 'notes.' However, these works have given a healthy stimulus to the rudimentary study of the ancient authors. In 1831, A. received the degree of LL.D. from his Alma Mater. In 1835, he succeeded Prof. Moore in the chair of languages. A. likewise published large works on ancient geography, Greek and Roman antiquities, mythology, literature, etc.

ANTHON, JOHN, LL.D.: lawyer: 1784, May 14—1863, Mar. 5; b. Detroit; brother of CHARLES A. He graduated at Columbia College 1801, was admitted to the bar 1805, became a founder and pres. of the New York Law Institute, and published *Anthon's Law Student* and *American Precedents* (1810), and other works.

ANTHONY, *ăn'tho-nĭ*, HENRY BOWEN: 1815, Apr. 1—1884, Sep. 2; b. Coventry, R. I.: statesman. He graduated at Brown Univ. 1833, edited the *Providence Journal* 1838-59, was gov. of R. I., 1849-51, and U. S. senator from 1859 till his death, serving on the committees on claims, naval affairs, mines and mining, and post-offices and post-roads.

ANTHONY, JOHN GOULD: 1804, May 17—1877, Oct. 16; b. Providence, R. I.: naturalist. He received a limited education, was engaged in commercial business Cincinnati 35 years, applied himself closely to the study of natural history from boyhood, accompanied Prof. Agassiz on the Thayer expedition to Brazil, 1865, and was in charge of the conchological dept. of the museum of comparative zoology from 1863 till his death.

ANTHONY, SAINT: see ANTONY, SAINT.

ANTHONY, SUSAN BROWNELL: reformer; b. South Adams, Mass., 1820, Feb. 15; d. March 13, 1906. She was educated in a Friends' school, taught school in N. Y. 1835-50, began speaking in public 1847, aided in organizing the woman's N. Y. State Temperance Soc. 1852, became a leader in the anti-slavery movement 1857, and began advocating the coeducation of the sexes 1858. After 1854 she directed her energies to promoting the cause of woman's suffrage, and 1868 began publishing *The Revolutionist* in aid of the movement. In 1870-80, she lectured in all the n. and several of the s. states, and 1881 in conjunction with Elizabeth Cady Stanton and Matilda Joslyn Gage published *The History of Woman Suffrage* in four volumes.

ANTHONY, WILLIAM ARNOLD: physicist: b. Coventry, R. I., 1835, Nov. 17. He graduated at the Sheffield Scientific School (Yale) 1860; taught the sciences at E. Greenwich, R. I., 1860-61. Franklin, N. Y., 1863-67, An-

tioch College 1867-69, and the Io. Agricultural College 1869-72; and was prof. of physics in Cornell Univ. 1872-87; consulting electrician, Manchester, Conn., 1887-93; and since 1893 has practised in N. Y. and has been prof. of physics in Cooper Union School of Science. He has designed and constructed a number of important electrical apparatus, and contributed numerous papers to several electrical and scientific publications.

ANTHONY'S FIRE, *ăn'to-nĭz*, St.: erysipelas (q.v.): see Antony, Saint.

ANTHONY'S NOSE: (1) in Montgomery co., N. Y., on the n. branch of the Mohawk river, on the extremity of the hill or mountain called the Klips (rock or cliff); slopes from an elevation of about 500 ft. toward the river, and when viewed from the river at the n. entrance to the Highlands resembles a nose 300-400 ft. long; (2) bold promontory on the e. side of the Hudson river in Putnam co., N. Y., projecting from the s. side of Breakneck Hill, opposite the site of old Fort Montgomery, near the s. entrance to the Highlands, below West Point.

ANTHOPHORE, *n. ăn'thō-fōr* [Gr. *anthos*, a flower; *pho'rĕō*, I carry]: in *bot.*, a stalk supporting the inner floral envelopes, and separating them from the calyx.

ANTHOPHYLITE, n. *ăn'thō-fĭl'īt* [Gr. *anthos*, a flower; *phullon*, a leaf]: a variety of hornblende of a gray or clove-brown color, so named from the resemblance of its color to that of the *anthophyllum* or clove; it is sometimes green.

ANTHOTAXIS, n. *ăn'thō-tăk'sĭs* [Gr. *anthos*, a flower; *taxis*, arrangement]: in *bot.*, inflorescence.

ANTHOXANTHUM: see Vernal Grass.

ANTHRACENE, n. *ăn'thra-sēn*, or An'thracin, n. *-sĭn* [Gr. *anthrax*, or *anthrăka*, burning coal]: a solid, crystalline hydrocarbon ($C_{14}H_{10}$) obtained from coal-tar. See Alizarene.

ANTHRACITE, n. *ăn'thră-sīt* [Gr. *anthrax* or *anthrăka*, burning coal]: a hard shining coal that burns without smoke of flame. Anthraconite, n. *ăn-thrăk'ō-nīt*, a term applied to those varieties of marble which have a coal-black lustre when polished. An'thracit'ic, a. *-sĭt'ĭk*, pertaining to.

ANTHRACITE: hard coal; a mineral substance of the nature of coal; consisting of carbon with a minimum amount of hydrogen. It is of a black color, conchoidal fracture, and imperfectly metallic lustre (hence called *glance*-coal). It burns slowly, and mostly without flame, and hence is sometimes called *blind*-coal. Its vegetable origin cannot be doubted. Where strata of common coal have been broken through by trap-dikes, the coal next the trap is found to be A., with a gradual transition into the softer state; hence geologists regard A. as debituminized coal; it occurs where rocks have been altered by heat from disturbance. Extensive mines of A. are in e. Penn., whence is derived most of the fuel used in the states of the

Atlantic sea-board for manufacturing and domestic purposes. See COAL: CARBONIFEROUS SYSTEM.

ANTHRACOSAURUS, n. *ăn'thră-kō-saw'rŭs* [Gr. *anthrax*, coal; *sauros*, a lizard]: a large fossil saurian occurring in the coal-measures of Britain.

ANTHRACOTHERIUM, n. *ăn'thră-kō-thē'rĭ-ŭm* [Gr. *anthrax*, coal; *thērĭon*, a wild beast]: a fossil thick-skinned animal of the hippopotamus kind, found among the lignites.

ANTHRAKERPETON, n. *ăn'thră-kėr'pĕ-tŏn* [Gr. *anthrax*, coal; *herpĕton*, a reptile]: a genus of fossil reptiles of a primitive air-breathing type.

ANTHRAX, n. *ăn'thrăks* [Gr. *anthrax* or *anthrăka*, burning coal]: a carbuncle; a local suppuration which may be idiopathic, or may accompany other diseases as diabetes, or malignant fevers such as the plague, etc.—common also in lower animals. See SPLENIC FEVER: CATTLE-PLAGUE; MALIGNANT PUSTULE. ANTHRACOID, a. *ăn'thră-koyd* [Gr. *eidos*, resemblance]: pertaining to or resembling an anthrax or carbuncle.

ANTHROPOGRAPHY, n. *ān'thrō-pŏg'ră-fĭ* [Gr. *anthrōpos*, a man; *graphē*, a writing]: that branch of physical geography which treats of the distribution of the races of mankind. ANTHROPOID, a. *ăn'thrō-poid* [Gr. *eidos*, resemblance]: applied to those species of the monkey which most nearly approach the human form. ANTHROPOLITE, n. *ăn-thrŏp'ŏ-līt* [Gr. *lithos*, a stone]: a petrifaction of the human body, or a part of it. ANTHROPOLOGY, n. *ăn'thrō-pŏl'ō-jĭ* [Gr. *logos*, discourse]: the natural history of the human species; the science that has man for its subject. It includes Anatomy, Physiology, Psychology, Ethnology, History, Sociology, Theology, Æsthetics, etc.: see these titles: also ANTHROPOLOGY, and the references. ANTHROPOLOG'ICAL, a. *-pō-lŏj'ĭ-kăl*, pertaining to. AN'THROPOL'OGIST, n. *-o-jist*, one skilled in the knowledge of the natural history of mankind.

ANTHROPOID APES, a term applied to those apes (family *Simiidæ*) nearest in their organization to man. See APE.

ANTHROPOLATRY, n. *ăn'thrō-pŏl'ă-trĭ* [Gr. *anthrōpos*, a man; *latreia*, worship]: the worship given to a human being; a term employed in reproach. Thus, the early Christians accused the heathens of A., because, in their mythology, men were represented as exalted among the gods, although an *apotheosis* (q.v.) was in these cases alleged by their worshippers; and the heathens retorted the charge because of the worship of Christ; the reply to which was the assertion of his oneness with God. But the term is chiefly known in ecclesiastical history in connection with the employment of it by the Apollinarians (q.v.) against the orthodox Christians of the 4th and 5th c. with reference to the doctrine of the perfect human nature of Christ.

ANTHROPOLOGY, *ăn'thrō-pŏl'ō-jĭ* [Gr. *anthropos*, man; *logos*, discourse]: science of man. Though earlier used, particularly in French, to designate the science of man as an animal, and, before that, as the appellation of a certain body of theological doctrine, Anthropology has now come to have no such narrow meaning, but covers 'the whole science of man; man as an animal, man as a thinking being, and man as an actor in economic arts, institutions, literature, fine arts, religions and opinions' (Powell). In this broad sense Anthropology considers man, individual and racial; past, present, and future. It treats all aspects and all problems of his origin and development, his history and his achievements, his deeds, thoughts, dreams, and ideals,—all that has made man, and all that man has made. The classification of the subdivisions of Anthropology differs with various authorities, and in different countries (America, England, Germany, France, etc.) there is still some divergence in the use of such terms as Ethnology (q.v.) and Ethnography (q.v.) As a practical classification of the science of Anthropology, the following, based upon the schemes of Brinton and Powell, with modifications, may serve:

I. *Physical Anthropology* (Somatology).—Treats of the origin, nature, individual and racial development, comparative significance, etc., of the physical characters of man. Particularly important special subdivisions of this branch are: *Craniology* (study of the skull and its parts); *Anthropometry* (measurements of the bodily proportions, especially in the living subject).

II. *Psychical Anthropology* (Psychology).—Treats in like manner, and with equal range, of the psychical characters of man, in their individual and racial, their developmental and their comparative significance.

III. *Historical, Analytical* and *Interpretative Anthropology* (Ethnology).—The study of the development of human arts, institutions, governments, religions, languages, etc. This most interesting, and, perhaps, most important of the divisions of Anthropology, has several subdivisions: (a) *Sociology*, which deals with the origin, nature, development of institutions and social devices, games and related activities and amusements, marriage, laws, governments, etc.; (b) *Technology* (including *Æsthetology*), the study of the origin, development and significance of art and the arts, utilitarian and æsthetic, industrial, decorative, and pleasure-giving; (c) *Science of religion*, treating of the origin, nature, development and significance of the religious sentiment, its expression in the individual and the race, etc.; (d) *Philology* (or *Linguistics*), treating of the origin, nature, development and significance of language (gesture, sign, spoken, written, etc.) in the individual and in the race; (e) *Mythology* and *folk-lore*, the study of human philosophies (in whole or in part) of the universe, which lie without the realm of scientific knowledge.

IV. *Geographic* and *Descriptive Anthropology* (Ethnog-

raphy).—The aim of this branch of Anthropological science is to give 'a picture of the actual conditions of peoples.' It is a description of things as they are.

V. *Pathological Anthropology.*—The study of the pathological, abnormal, degenerate phenomena of the individual and of the races of man, psychical as well as physical. An important subdivision is *Criminal Anthropology,* which treats of the anthropological characters of the criminal considered as a class or 'type.'

VI. *Prehistoric* and *Reconstructive Anthropology* (Archæology).—The study of man and his works before the age of historic facts and monuments. This branch of Anthropology 'supplies that which neither the records of history nor present observation furnishes.'

The titles of works on general Anthropology exhibit still a certain lack of uniformity in nomenclature, some writers using Ethnology in practically the sense of the more inclusive and generic term Anthropology. For Anthropology several unsatisfactory terms, such as 'Human Biology,' 'Natural History of Man,' have been proposed from time to time, but they are all cumbersome or inexact, and this comparatively new science, which, in higher educational institutions, is gradually freeing itself from subordination to older departments in the curricula, is properly designated Anthropology, 'the science of man.' Some of the more important general questions and problems of Anthropology will be discussed briefly here, such as the origin of man; antiquity of man; individual and race; man, woman and the child; unity of mankind; civilization; future of mankind. These are but a few of the more interesting topics concerning which the present state of our knowledge is set forth.

Origin of Man.—The origin of man from the lower animals by processes of evolution or development is now the accepted theory in Anthropology. The arguments for this view were first ably set forth by Charles Darwin (q.v.) in his famous works, *The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (1859), and *The Descent of Man, and Selection in Relation to Sex* (1871), the titles of which contain the essence of the 'Darwinian theory,' and the 'theory of evolution,' which was popularly expounded by Huxley (q.v.), and made into a system of philosophy by Herbert Spencer (q.v.) and his followers. According to this theory, man is the last in a series of developments in the animal world, of which he alone is the consciously progressive representative. The physical resemblances between man and the anthropoids are such as led easily to the acceptance of the animal origin of man, in so far as his physical nature was concerned, but some evolutionists (especially A. R. Wallace, the co-discoverer with Darwin of the principle of 'natural selection') have not seen their way clear to the derivation of man's mental, moral and religious characteristics by the same processes of evolution from life below him. But the effort of Wal-

lace to withdraw the triumphs of the human intellect and their development from the field of evolution, in which were perfected the beauties and accomplishments of the human body, is belied by the psychological investigations of the last quarter of a century, and particularly by those researches, which, under the name of 'child-study,' have been concerned with the growth of consciousness and the mental, moral and religious faculties in the individual, as well as by the extensive mass of data now on record from the primitive peoples of all regions of the globe. The conclusion to be drawn from the facts revealed in both these departments of Anthropology is, that the mind has been just as much the subject of evolution as has the body of man. The psychic unity of mankind is the corollary of physical unity and both exemplify the workings of the laws of evolution, the one quite as much as the other. To an American psychologist, G. Stanley Hall (q.v.), is due much recent emphasis upon the theory of the 'evolution of the soul,' and his *Psychology*, now in process of compilation, will marshal the data in favor of the view that the mind and soul of man have grown from crude beginnings, as has his body, and are still in many respects developing, or unevolved. In regard to man himself, in all probability the factors of 'sexual selection' and 'natural selection,' in so far as the 'struggle for life' is concerned, have been emphasized too much by many evolutionists of the Darwinian school. With the very first appearance of man upon the scene, there has been a change from the predominantly physical struggle to one conditioned with increasing completeness by the specially human characteristics, particularly expressed, for example, in forms of cooperation, mutual aid, etc. Thus, Prince Kropotkin, in his recent volume on *Mutual Aid: A Factor in Evolution* (1903), is quite right in making 'cooperation' an important factor in human evolution. It is the mistaken idea of many that the first human beings were a warring set of people bent on exterminating each other,—more savage even than the brutes below them, and near them. There is, in fact, no evolution ground for the belief that the earliest creatures deserving the name of man, and their immediate successors, lived in a state of hardly intermittent combat. Not even the anthropoid congeners and ancestors of man, much less man himself, were of such a nature. Early man was peaceful, rather than warlike, lived in scattered communities, with family life practically monogamous, as is the case now with many primitive peoples; and it was not until the rise of large tribes and the development of purposeful migrations on a grand scale, that wars, properly so called, and fierce inter-tribal struggles became common. The primitive age, as opposed to the age of barbarism and the beginnings of civilization, may be characterized as peaceful, the energies of cave-man, and other early representatives of the race, existing here and there over wide areas of the habitable globe, being devoted

to the production and the perpetuation of human faculties, arts and industries (note, for example, the wonderful art-instinct revealed by the carvings, paintings, etc., of the prehistoric cave-men of western Europe; the high moral character of the very primitive Veddas of Ceylon and their monogamic family-life), and not to the destruction of one another. Indeed, the theory of evolution itself, rightly interpreted, demands that the earliest men should have been very human, as the best, unspoiled primitive races really are now.

As to what was the stimulus which led to the production, from the anthropoid ancestor (the animal from which sprang both the race of man and the apes nearest to him in the line of descent), of the creature with the hairless body, the finer-moulded features and bony structure generally, the upright posture, the wonderful hand and its dextral skill, the larger and more delicately constituted brain with its expression of greater intellectuality, etc., now known as man, opinions differ. Among the causes suggested, some relate to environment, others to food, and the like. According to some, the arboreal ancestor of man descended from the trees and took to the ground as a result of the oncoming of the ice-age with its intense cold, which compelled him to leave the tree-tops (no longer a sure provider of food) and accommodate himself to the plains, where he became a walker, a hunter and a tool-user (Grant Allen, Haacke, Wagner, J. Müller). Cushing suggested that the attractions of food, etc., on the sea-shore probably led the precursor of man to leave the trees, and that the first steps of human development took place there, with the digging-stick as the ancestor of many human implements, from the arrow to the plough. Winwood Reade, from observation of the gorilla's habit of assuming the upright position in order to see more distinctly the approaching hunter, concluded that curiosity, perhaps, was the chief factor in producing the characteristic human attitude. Lately Schoetensack and Klaatsch have put forward the view that the essential factor in the change from anthropoid to human was the metamorphosis of the environment from one of continuous forest and uninterrupted tree-tops, such as exists still in parts of tropic America, Africa, etc., to one characterized by long-trunked, branchless trees (with fruit, etc., at the top) standing apart from one another,—the different physical development of the hands and feet necessary for the climbing of the latter (compare the way the Australian blacks do it today), and the much more frequent contact with the ground made common thereby would account for the evolution of the human limbs, as we now have them. As to the place of man's origin, various views are entertained today. The majority of authorities (but the number of such is decreasing) seem still inclined to look for the appearance of the first representative of the human species somewhere in the tropics, possibly in southeastern Asia (the latest 'missing link,'

the *Pithecanthopus erectus*, was discovered in Java in 1894 by Dubois; and Schoetensack and Klaatsch have very recently fixed upon Australia as the scene of the development of man), but, both by reason of the fossil remains of anthropoids there discovered, and from consideration of the history of man in that region, many are inclined to look for it in western Europe and northwestern Africa (geologically one), either before or after a glacial period, or, perhaps, during an interglacial epoch. America, also has been advocated as the scene of the making of man, and in 1906 Professor R. Senet of Laplata, résuméing the data concerning prehistoric man and the fossil anthropoids in the Argentine region of South America, argues for that quarter of the globe. More evidence is needed to settle the question, but the western European theory seems to be gaining in favor. This would make man's appearance occur approximately in the region where the greatest human achievements have taken place in the near and the remote past.

Antiquity of Man.—The great antiquity of man's residence upon the earth is now conceded on all hands. The criteria of its measurement are various. Archæological researches, during the last quarter of a century, and especially during the last ten years, have demonstrated the great antiquity of the civilizations of the Mediterranean area (Egypt, Mesopotamia, Cyprus, the Ægean Islands, Mycenæ, Crete, etc.), and beyond them lie immense periods of time during which the social, artistic, and religious phenomena represented by them evolved from crude human beginnings. There is also the antiquity of Chinese culture to reckon with; likewise the old cultures of Mexico, Central and South America and the primitive life preceding all these. That culture of a sort belonging with large aggregations of human beings and the sedentary arts and ideas incident thereto is at least 10,000 years old in some part of the Mediterranean basin can hardly be doubted, and a somewhat lower form of culture existed sporadically over much of the same area and over a considerable portion of central and western Europe long before, and, in part, contemporaneously for many centuries. European archæologists have generally seen fit to divide the age of man into periods called after the material characteristically employed for weapons, tools, etc. These are as follows: *Stone Age* (divided into the *Palæolithic* and *Neolithic* epochs,—in the former man used stones roughly chipped, in the latter polished and smoothed stone implements, etc.); *Bronze Age* (and in some regions, perhaps, a preceding *Copper Age*); *Iron Age.* Within the last few years Belgian and French archæologists in particular have claimed the existence of a stone age of cruder type, to which the name 'Eolithic' (earliest stone) has been applied, and some other writers even recognize a 'Prelithic' period, in which man knew not the use of stone implements and tools. Criteria of the antiquity of man are the age of the geological

deposits in which relics of prehistoric races have been found (few, if any, convincing proofs of Tertiary man have yet been produced in the Old World or the New), the time assumed to be necessary for the production of the various human races (all of which are known now to be prehistoric), and for the development of the various periods of primitive culture and subsequent civilization. Estimates in these matters differ greatly. Professor G. G. MacCurdy, in his notable discussion of *The Eolithic Problem* (1905), considers that Rutot's estimate of 139,000 years (of which 84,000 are assigned to the Palæolithic) for Quaternary man is none too high; and for Tertiary man many millenniums more would have to be added, besides the count necessary for the subsequent Neolithic, Bronze, Iron and Modern periods. Keane, the English ethnologist, assumes 'not less, probably more, than half-a-million years as the probable duration of man's residence upon the globe, over the whole surface of which he spread in Palæolithic times.' Many authorities, however, consider about 200,000 years (civilization and its approximates 12,000 years; Neolithic and cognates 20,000) a fair estimate. These 'ages,' 'epochs,' 'periods,' etc., undoubtedly differed considerably locally, and there were overlappings, and the fact illustrated by the projection of many American Indian tribes from the Stone Age into the Iron Age as a result of the advent of the Europeans (the succession of Stone, Bronze, Iron does not characterize the prehistoric New World as it is held to do the Old) may have been paralleled in prehistoric Europe. Other estimates of the antiquity of man, based upon the time requisite for the development of modern civilization through the various stages, 'culture-epochs', etc., reach even higher figures, but the same reservations with respect to local variations, overlappings, etc., would apply. An orderly procession of epochs, capable of being used as a time-criterion, has yet to be established. The best estimates, it may be said, run from 50,000 years, at the lowest range, to 200,000 at the other end, with always the possibility of increase due to new discoveries.

Individual and Race.—One of the most interesting anthropological and biological theories is that, in the course of development the individual repeats, often in quite telescopic form, the history of the race, in fact, of the whole animal series. In man much of this is done before birth, but the child, in his mental and moral evolution, illustrates the 'recapitulation theory,' as it is called, reproducing, in more or less noticeable fashion, the stages of development of the human race. Another noteworthy fact in human life is the 'prolongation of infancy,' with which is associated, later on, the 'play instinct' of the young human being, by virtue of which plasticity of mind and body is assured during the educational epoch of the individual's existence. The helpless infancy of the human being and the dominance of the play-instinct are chiefly responsible for the development of the nobler qualities

of mankind and for the evolution of the graces of modern culture. Their influence upon the history of the race has been as great as upon that of the individual. The less admirable side of the relation between the individual and the race is to be seen in 'atavism,' the characteristic phenomena of which are the appearances in the individual of peculiarities no longer the possession of his parents or close congeners, but harking back to ancestors, individual or racial, much more remote. Some regard crime and its attendant phenomena as largely atavistic (reversions to savagery, etc.); others regard as atavistic, more or less, the mental and physical characteristics of idiocy and various other 'degenerate' and 'abnormal' states of man, some even going so far as to recognize 'Mongolian types' of idiots and the like. These views, however, have less vogue than they had ten years ago, the criminological school being now less radical, and likewise the psychiatrical, in matters of 'race psychology.'

Man, Woman, Child.—Another interesting aspect of Anthropology is concerned with the relations of man, woman, and the child to the human race in general. In his *Man and Woman* (1902), Havelock Ellis has set forth the theory (advanced in various ways long before, in part at least) that 'the human infant presents in an exaggerated form the chief distinctive characters of humanity,' such, for example, physically, as the large head and brain, small face, hairlessness, delicate bony system, etc., and, mentally, the phenomena of precocity and child-genius; that woman, in like manner, 'bears the special characteristic of humanity in a higher degree than man, and has led evolution in many respects (see on this point O. T. Mason's *Woman's Share in Primitive Culture* (1894), because she is nearer the child;' and that man (the male element), through the rather necessary adaptation to the environment of the past, has departed most from the ideal human type, which, however, amid the gentler activities of the time and the alleviations of the 'struggle for existence,' he is now evolutionally regaining. The general tendency of the age, seen particularly in favored urban communities of the chief civilized races today (the American, most of all), is toward the peaceful, more thoroughly human type, of which woman has long been the prophecy, and the child the suggestion. The position of the child in Anthropology has been discussed by Baldwin in his *Mental Development in the Child and the Race* (1895), and by Chamberlain in his *The Child and the Race: A Study in the Evolution of Man* (1900). The ideal sides of these questions are seen in the 'eternal-womanly' of Goethe, and in the 'of such is the Kingdom of Heaven' of Jesus. In Anthropology we can discover how 'a little child' does really 'lead'; how the child is 'father of the man' and 'brother of the race.' The facts revealed by Anthropology also go far toward showing how little true religion has to fear from the revelations of science and

the doctrine of evolution. Human culture has always been tempered by the child and by woman, both religious by nature, and no human race known is without the beginnings of some sort of faith or cult, prophesying the beliefs of today.

Unity of Mankind.—That all human races now existing have had their origin from one common primitive stock is the general opinion of anthropologists today; and this, too, was the view of Darwin. The physical and psychical unity of mankind is now demonstrated beyond all doubt. Racial differences are now recognized as having been produced by and perpetuated by factors of climate, food, isolation, intermixture, natural, sexual, and social selection, etc. As Professor W. H. Holmes has well said, if we free our minds from the differences in appearance that result from culture and civilization and so prejudice us in judging other races, and look at the average man, woman and child of every race without such spectacles as those through which we ordinarily see them, we realize in a moment how much alike (rather than different) in all essential features all the human races are. In no race do we fail to find the typical human characters both physical and psychical. If it were possible to arrange all the members of all the races in one continuous line, we should be able probably to pass from the lowest individual to the highest in point of evolution without any considerable sense of disparity, i.e., if we arranged them according to color-shade, physiognomy, or any other such test. If we could take in at a glance the whole of humanity in this way, the conviction of its unity would be unescapable. How far the lowest human beings are really above the highest apes may be shown, as Professor Holmes suggests, by comparing the Australian blacks with the anthropoids (gorilla, chimpanzee, etc.). This may be done first physically, then psychically, and then no one can for a moment be deceived into believing that 'the highest ape is higher than the lowest man.' All historic, and probably also all prehistoric, human races, highest and lowest together, belong within one unity, to which the anthropoids can lay no claim to membership, since their relation to the human stock is more remote even than cousinship. Man and the great apes are groups of beings now but remotely akin, since the development by the former of 'beauties of body and of mind,' and the complete subjection of the latter to the effects of a limited environment have for ages upon ages been increasing the gulf between them. It is millenniums and millenniums since a man was near an ape, or an ape near a man. In apedom the limits of evolution have been narrow and restricted, and not since the birth of the first man has there been any hope of a monkey babe turning out to be human. In the words of the late Major J. W. Powell, 'Beast is beast, and man is man.' The question of 'higher' and 'lower' human races is therefore not one of proximity to or remoteness from the anthropoids, but one of more or less ideal

humanity, conditioned by favorable and unfavorable environments, opportunities for contact and expansion, historical experience, education, etc.

Civilization.—The origins of civilization are best accounted for on the theory of the essential psychic unity of the human race, with variations along certain lines. The most recent archæological investigations have carried back the period during which somewhat highly organized human communities, with various social institutions (including village life, etc.), have existed continuously in western Europe to a remote age, antedating that of the great classic civilizations of Europe and Asia by many thousands of years. The old idea that the Aryans originated in Asia and brought with them a quasi-culture, when they invaded Europe, is now abandoned by all the best authorities, who recognize that Aryan civilization as such developed in Europe and that Europe has influenced Africa and Asia much more in prehistoric times than has hitherto been believed. Even the use of bronze may have been European in origin. The 'Europeanization of Asia,' and not the 'Aryanization of Europe,' has long been the great culture-problem, past and present. The best idea of the origins of human civilization may, perhaps, be obtained from the study of the history of the great Mediterranean area and adjacent countries from the earliest known prehistoric period down to the present time. All the shores of this great sea appear to have been culture-producing; and many of its islands even more so. The commingling of human tribes all over this area, which nature has so heavily bonused in man's favor, the facilities for commercial intercourse, the abundance of eligible sites for settlements of every sort, from the cave-shelter and the lake-dwelling to the village and great city,—all these, and many other factors, conspired to make the development of civilization on a large scale comparatively easy for prehistoric men and women. Absence of race-prejudice, as Dr. Franz Boaz has pointed out, was also a stimulus, enabling each budding culture-group to attach to itself, if necessary, members of all races existing at the time. The topography of the Mediterranean is such as to have encouraged in early times the development of special civilizations in various parts of its great area, which were thus enabled (e.g. the Greeks in art, the Hebrews in religion, etc.) to carry out certain human ideas to almost their full limit. For the history of human civilization some of the islands of the Mediterranean are more important than the adjoining mainland,—for Phœnician culture, if we trust the latest investigations, is an appendix only of that of Cyprus; and Crete and the Ægean islands stand in somewhat the same relation to parts of continental Greece. Today the belief can be no longer entertained that the Egyptians, the Phœnicians, the Greeks, or the Italians civilized the whole Mediterranean area, for long before these great culture-centers had assumed their prominence, the beginnings of civilization had appeared

sporadically all over its European, African and Asiatic borders, particularly the European, which, according to present evidence, may have been the birth-place of its extensive culture, propagated from time to time southward and eastward. The early presence of cave-man with his notable art-instinct in western Europe may have been followed by equally precocious developments of other human characteristics, out of which soon grew 'the civilization of the Mediterranean,' the impress of which is rather European than African or Asiatic. The 'Oriental mirage,' in accordance with which earlier writers sought the origin of all the elements of European culture in Asia, is now disappearing, and we are able to see how much of the achievements of the human race was enacted in what was historically, or geologically, Europe. The problem of the origins of the Asiatic culture of the Chinese, Koreans, Japanese, etc., is not yet solved, but the recent entrance of Japan into the ranks of the world-powers and the awakening of China now in process are proof enough that the yellow race is not lagging far behind the white in the essential human qualities. The long-continued existence of Chinese civilization is another proof of the equality of human races, in so far as the creation and maintenance of great aggregations of human beings and the phenomena of urban communities are in question. In America the aborigines represent the culture-phenomena of a great environment shut off for ages from all other inhabited areas of the earth. The culture-area of primitive America is the Pacific slope, from central Mexico to northern Chile, touching the Atlantic in Yucatan and the Argentine. In this area phenomena somewhat similar to those acting in the case of the 'Mediterranean area' of the Old World have produced the 'ancient civilizations' of Mexico, Yucatan, Colombia, Peru, etc., which, in some respects, were comparable to certain aspects of Mediæval culture in Europe. The most recent investigations in Peru reveal, according to Dr. Uhle, a much more ancient residence of semi-civilized man in this region than is generally believed by good authority; indeed, there has been a succession of 'cultures,' like that characteristic of the great culture-seats of the old World (Troy, Cyprian and Cretan cities, etc., Mycenæ, Rome), indicating likenesses in the progress as well as in the characteristics of the civilizations of both hemispheres. The absence of such domestic animals as the horse, cow, sheep, etc., the lack of such inventions as the wheeled carriage, and the like, account for the fact that the primitive civilizations of America did not reach the same point as did those of the Old World. The isolation of the African Negro in the more or less tropical regions of the continent, and his separation from the culture-bearing territory of northern Africa by a pre-Sahara sea, as some think, led to the perpetuation, among Negro tribes, of such institutions as slavery and polygamy, which, together with the persistence of belief in witchcraft and the absence of a written language.

accounts in large measure for the failure to develop throughout Negro Africa forms of culture comparable in all respects with those of the Mediterranean area. That the Negro race is capable of civilization is fully demonstrated by its development in contact with the Hamitic and Semitic races (Berbers and Arabs) in the Sudan, etc., by the achievements of the South African blacks, and, again by those of the American Negroes. Recent archæological investigations in Western Africa, the Sahara, and the Sudan, give reason to attribute to the Negro before the period of contact with the whites more elements of culture than he is commonly credited with. The history of the art of smelting iron, by some good authorities considered a Negro invention, and of the development of stringed instruments like the harp and the piano, makes it probable that the origin of more than one important human instrument and invention is to be sought in Negro Africa. Taking in all the races of man at a glance, we find abundant justification for the conclusion reached by Dr. Franz Boas, the eminent American anthropologist, that 'the earlier rise of civilization in the Old World was largely a matter of chance,' and 'historical events have been much more potent in leading races to civilization than their faculty.' Hence, it is quite deceptive to assume unreservedly that the greater achievements of any one race are proof that it is the more highly gifted. Indeed, in ages to come, the white race may find itself outstripped by the yellow. Any human race now surviving in sufficiently large numbers will have its share in the future world-civilization, as many have already had that are now extinct or practically so.

Future of Mankind.—A survey of the peoples of the earth at the present day shows that, even after ages of war and military conquest and subjection and extermination of tribes and nations, in ancient and in modern times, all the great races of man still survive in sufficient numbers to make their complete disappearance, in any other way than by the process of mingling together, a practical impossibility. Of the 1,500,000,000 human beings who now inhabit the earth, 750,000,000 belong to the white race and its varieties; 600,000,000 to the yellow (Mongolian): 150,000,000 to the black (and varieties); 40,000,000 to the brown (Malayo-Polynesian); and at least 15,000,000 to the red (American Indian). In Japan, China and Farther India, the yellow race is notably increasing in every way; the native population of Java and the Philippines continues to multiply, likewise the black peoples of certain parts of Africa, particularly in the South; the Indians, except in the regions north of Mexico, are either holding their own, as a rule, or increasing in numbers; and the American Negro is not at all dying out as some suppose. The physical characters of none of the human races are such as to forbid their ultimate amalgamation, which, on a greater or a larger scale is now taking place all over

the globe, favored everywhere by the emphasis laid upon education, social accomplishments, wealth, and the innumerable forms of service recognized by the increasing spirit of altruism and democracy. With the complete disappearance of so-called 'race-prejudice,' which is not physiological but social, the intermingling of races will become more general, aided by the importance to the world of such 'new' peoples as the Japanese, the Chinese, the Filipinos, etc., in industry, art, literature, science, etc. One of the most interesting characters of man as man is his power to reduce or abolish the differentiations and variations produced in the course of his wanderings over the globe, and his isolations and specializations, and to create a great human unity in which shall at last be assembled the best there is from all the races. As Professor Holmes well expresses it, 'the period of differentiation is closed for ever and the period of universal integration is upon us.' This means that a day is coming when 'blood and culture will be cosmopolitan.' It remains to be seen whether the race that today leads in the world's progress will be able, physically and intellectually, morally and religiously, to dominate this fusion of body and soul. See MAN; ETHNOLOGY; DESCENT OF MAN; DARWINIAN THEORY; SPECIES; DEVELOPMENT OF THE EMBRYO; etc.

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ANTHROPOMETRY, n. *ăn'thrō-pŏm'ĕ-trĭ* [Gr. *anthrōpos*, a man; *metron*, a measure]: the systematic examination of the heights, weights, etc., of human beings; the art of measuring the remains of past races of men with the view of comparing different races. AN'THROPOMET'RIC, a. *-mĕt'rĭk*, pertaining to the art of measuring the human figure, or human remains.

ANTHROPOMORPHISM, *ăn'thrō-pō-mŏr'fĭzm:* the application, in a figurative way, to God, of terms which properly relate to human beings. Thus, in the Holy Scriptures, we read of the eye, the ear, the arm, the hand of God; and of his remembering, forgetting, etc. This A. appears to arise of necessity from our incapacity of forming conceptions of things spiritual, or finding any terms in which to express them, except by analogies derived from things cognizable by our senses, so that even the language of adoration is borrowed from the familiar things of this world. It is evident that A. employed in an unguarded manner, or too grossly understood, might lead to most serious error; and a tendency has manifested itself at various times in the history of the Christian Church to ascribe to the Divine Being a form and parts like those of men. Thus, the Audæans (q.v.) or Audians, a Syrian monastic sect in the 4th c., were accused, and, it seems, justly, of holding that God was possessed of a human shape, and that, when the Bible said that 'God created man in his own image,' the words are to be understood of this shape literally. The same error was at a later period ascribed to the Waldenses, but there was no evidence of the justice of the accusation. A tendency to A. may indeed be regarded as always existing, and so requiring to be guarded against in the mind of every man; but the instances have been rare and isolated, although they have from time to time occurred, in which anthropomorphite views have been fully adopted and openly expressed among Christians. The error of the anthropomorphites has, however, found countenance from the speculations of philosophers. Hobbes, Forster, and Priestley ascribed to the Divine Being a sort of subtile body. Fichte, on the other hand, rejected the very doctrine of the personality of the Divine Being as anthropomorphic, and represented God as the *moral order of the universe;* and Schelling, Hegel, Feuerbach, and Schleiermacher substituted, or used terms which might be understood as substituting, for the objective personality of God a subjective consciousness of God in the human soul.—The term *Anthropopathism* is sometimes employed to denote the ascription to God of human affections and passions, although A., in its most general sense, includes this. The language of Scripture, in the many instances of this kind, must be interpreted according to the same general principles which are applicable in those of A. strictly so called, with the same discrimination of the figurative from the literal, and the same constant recognition of the absolute spiritually and unchangeableness of God; yet so that important truths conveyed by means of such language, and which it is probable could only be conveyed to us by such language, in accordance with our mental constitution may not be rejected or obscured.

ANTHROPOMORPHITE, n. *ăn'thrō pō mŏr'fīt* [Gr. *anthrōpos,* man; *morphē,* form, shape]: one who attributes a human form to the Diety. -MOR'PHISM, n. the doctrine. -MOR'PHOUS, a. pertaining to that which resembles a human form. AN'THROPOMOR'PHIC, a. *-mŏr'fĭk,* of or pertaining to. AN'THROPOMORPHIS'TIC, a. *-tĭk,* having a tendency to attribute a human form to the Deity.

ANTHROPOPATHISM, n. *ăn′thrō-pŏp′ă-thĭzm* [Gr. *an-thrōpos*, a man; *păthos*, affection or feeling, passion]: the doctrine that ascribes human passions to the Supreme Being. AN′THROPOPATH′IC, a. *-pō-păth′ĭk;* or AN′THROPOPATH′ICAL, a. *-ĭk-ăl*, pert. to: subject to human passions. ANTHROPOPATHY, n. *ăn′thrō-pŏp′ă-thĭ*, human affections or passions as pert. to the Supreme Being.

ANTHROPOPHAGI, n. plu. *ăn′thrō-pŏf′ă-jī* [Gr. *anthrōpos*, a man; *phagein*, to eat]: men that eat human flesh. See CANNIBAL. AN′THROPOPHAGIN′IAN, n. *-ă-jĭn′ĭ-ăn*, a cannibal. AN′THROPOPH′AGOUS, a. *-pŏf′ă-gŭs*, feeding on human flesh. AN′THROPOPH′AGY, n. *-pŏf′ă-jĭ*, the practice of eating human flesh.

ANTHROPOTOMIST, n. *ăn′thrō-pŏt′ŏ-mĭst* [Gr. *anthrōpos*, a man; *tomē*, a cutting]: an anatomist of human bodies.

ANTHURIUM, n. *ăn-thū′rĭ-ŭm* [Gr. *anthos*, a flower; *oura*, a tail]: in *bot.*, a genus of plants of the Arum family having their inflorescence in the form of spikes like tails.

ANTHUS, and ANTHIDÆ: see PIPIT.

ANTHYLLIS: see KIDNEY VETCH.

ANTI, *ăn′tī* [Gr.]: a prefix, with its form ANT, signifies against or opposite; in place of.

ANTIARIS, and ANTJAR: see UPAS.

ANTIBES, *ŏn-tēb′* (anciently *Antipolis*): fortified seaport in the dept. of the Alpes Maritimes, in the s.e. of Provence, France; lat. 43° 34′ n., long. 7° 8′ e.; on the e. side of a small neck of land called La-Garoupe, w. from the mouth of the Var; in a fertile district. The harbor is serviceable only for small craft. It is a military station of the third rank, has a naval school, and considerable trade in olives, dried fruits, salt-fish, oil, etc. The anchovies prepared at A. are held in high estimation. The environs of the town are beautifully adorned with gardens, vineyards, and orchards.

A. is a very old place, founded by a colony of Greeks from Massilia (Marseilles), of which it was a dependency. In the time of Augustus it was elevated to the rank of an Italian city, and many ruins still testify to its ancient prosperity. After the wreck of the old Roman empire, A. became subject to successive tribes of barbarians from the north. In the 9th c., it was destroyed by the Saracens; in the 16th c., it was fortified by Francis I. and Henry IV.; during the Australian War of Succession, it sustained a siege of three months (1746). A. closed its gates against Napoleon on his return from Elba. Pop. (1901) town 5,512; commune 10,947.

ANTIBILIOUS, a. *ăn′tĭ-bĭl′yŭs* [Gr. *anti*, against, and *bilious*]: good for the cure of bilious complaints.

ANTIBRACHIUM, n. *ănt′ĭ-brăk′ĭ-ŭm* [Gr. *anti*, in front of; Gr. *brachĭōn;* L. *brachĭŭm*, the arm]: the fore-arm of the higher vertebrates, composed of the radius and ulna. ANTIBRACH′IAL, a. *-ĭ-ăl*, pert. to.

ANTIC a. *ăn'tĭk* [F. *antique;* OF. *antif,* ancient—from L. *anti'quus,* old]: odd; fanciful: N. odd appearance; a buffoon; in *arch.,* a grotesque figure used as an ornament. ANTICS, n. plu. odd or extravagant gesticulations; grotesque and foolish actions. ANTICLY, ad. *ăn'tĭk-lĭ. Note.*—On the revival of art in the fourteenth and fifteenth centuries the ancient models were imitated in sculpture-work, and the copies called *antiques;* monstrous and caricature representations in sculpture became very common, and known by the same name; hence any grotesque figure in sculpture was called an *antique* or *antic,* figuratively transferred to grotesque contortions of body or conduct.

AN'TICHLOR, *ăn'tĭ-klōr* (from *chlorine* and *anti*). In bleaching, any substance used to eliminate, by chemical means, the last traces of chlorine from a material that has been bleached by the action of a chlorine compound. The free chlorine can be largely removed by mere washing but it cannot be entirely eliminated in this manner, and the residuum, if not removed by chemical means, is injurious to the material and causes it to disintegrate slowly. Sulphur dioxid was long used as an antichlor, and sulphite of soda, Na_2SO_3, is effective, but sodium thiosulphate (better known in the arts as hyposulphi e of soda, or 'hypo,') is now more commonly used as an antichlor, since it is both cheaper and more efficacious. Its formula is $Na_2S_2O_3$, and its action is as follows: $Na_2S_2O_3 + 5H_2O + 8Cl = Na_2SO_4 + 8HCl + H_2SO_4$.

ANTICHRIST, n. *ăn'tĭ-krīst* [Gr. *anti,* against, and *Christ*]: a false Christ; an antagonist of Christ. AN'TI-CHRIST'IAN, a. *-krĭst-yăn,* opposing the Christian religion, or opposite to it. The general notion of Antichrist as a power opposing itself to the reign of the Messiah, may be traced back beyond the Christian era. Its origin is perhaps to be found in the prophecy of Ezekel (Ezkl. xxxviii. 2; see also Rev. xx. 8) concerning the doom of Gog and Magog. In accordance with the old saying, 'When need is sorest, help is nearest,' the Jews conceived that, immediately previous to the Messiah's reign, national adversity must be experienced in an extreme degree, and that an agent of Satan would appear, who must be overcome before prosperity could be restored. This agent was A. The idea is adopted in the New Test., although the term A. occurs in no place of Scripture except John I. and II. From such passages as the prophecies of the Saviour, Matt. xxiv. and Mark xiii., it has been inferred by some that probably the great truth which this conception was intended to shadow forth was similar to that illustrated in the life of 'the Man of Sorrows'—that only through tribulation and strife could the reign of the Messiah be established, that Christ's kingdom, like Christ himself, could be made perfect only through suffering. And with this the language of John in his epistles, and of Paul in passages which seem to embody the same idea, is supposed to accord. Nor is it regarded as a fatal objection to this opinion, that in the Apocalypse the Antichristian power or element is associated

with the great heathen capital Rome, symbolically designated Babylon.

But this opinion neither has been nor is generally prevalent. The idea of A. early became associated with that of the Millennium (q.v.) retaining a form very similar to that which it had among the Jews before the advent of the Messiah; and popular opinion has always sought to find for it some actual and definite embodiment. In the 5th c., a popular delusion prevailed, founded on the passage in the Apocalypse, Rev. xvii. 8, that Nero was not dead and would return in the character of A. After the 16th c., a prevalent opinion among Protestants was that A. is the Rom. Cath. Church; an idea entertained even at an earlier period, as, for instance, by Ludwig of Bavaria, regarding Pope John XXII., by Occam, Wickliffe, and his pupil Cobham, and the Bohemian reformer Janow, and which seems to have prevailed to a considerable extent among the Hussites and other opponents of Rome. This opinion still lingering, but no longer largely advocated among the leaders of Protestant thought, has been powerfully opposed by Roman Catholic writers, as by Bossuet, who, in his comments on the Apocalypse, ably advocates the opinion that Pagan Rome was A. The opinions of Roman Catholics, however, are much divided concerning A., many maintaining that A. is yet to come and 'to raise the last persecution,' as 'no one has yet appeared to whom we can apply the character which the infallible Word of God declares shall be that of the real A.'

The opinion prevalent among Protestants depends upon the identification of A. with the mystical Babylon of the Apocalypse, and with other symbolic representations in that book, of a power opposed to the cause of Christ, and also with the 'Wicked one,' the 'Man of Sin,' and 'Son of Perdition,' 2 Thess. ii. Thus it is still maintained by some that a definite embodiment of the idea of A. is to be sought in history, and that this is to be found in the Church of Rome, or rather in the papal power. And such Protestant advocates refer to the gradual growth and development of the errors which they regard as culminating in the Latin Church, as accordant with the declaration of the apostle Paul, 2. Thess. ii., that 'the mystery of iniquity doth already work,' and with that of John, 'even now are there many antichrists.'

There have been, however, among Protestants even from an early period eminent opponents of this opinion, among whom may be named Grotius. His own opinion was singular, that Caligula, the Roman emperor, was A. In the Greek Church, the term A. has been understood as especially applicable to Mohammed, or to the dominon of the Turks and Saracens. Almost every great or striking event—the arrival of the year 1,000; the beginning of the Crusades; the 'black death' and other plagues in the 14th c.; the career of Napoleon in 1805; and even the political movements of 1848-49—has suggested new interpretations of the passages of Scripture regarding A. See REVELATION OF JOHN.

Hitherto the interpretation of the Scripture texts relating to A. has not been instructive. 'Much error,' says Dr. Samuel Davidson, 'has arisen from mixing up Daniel's vision with those of the Apocalypse, because they refer to different subjects. The apostle borrows characteristic features from Daniel's Antiochus Epiphanes, to fill out his picture of Nero. The combination of St. Paul's Man of Sin with St. John's antichristian Nero has also led to misapprehension. The idea is variously developed, according to the mental peculiarities and knowledge of those who entertained it. Vague and general at first, it was afterward narrowed, somewhat in the manner of the Messianic one. Its different forms show that it was no article of faith, no dogma connected with salvation. Less definite in the second epistle to the Thessalonians, it is somewhat specific in the Revelation. . . . The author of John's first epistle gave the idea of Antichrist a spiritual width, consistently with the whole direction of his epistle. In each case, however, the writers moved within their own times, their knowledge bounded by the necessary limits of the human intellect, so that their subjective views can hardly be accepted as the emanations of minds projecting themselves into the future with infallible certainty. What they express about Antichrist is their development of an idea which sprang out of Jewish soil. . . . It is the very individualizing of the A. idea which removes it from the sphere of actual realization.' These views, so far as they regard the Hebrew cast of the prophetic idea of A., and the national horizon which limited the scope of its imagery, are probably shared by the majority of recent biblical scholars. But, when the *personal* element is ruled out, and an abstract A. brought in to fill its place, in the interest of making the prediction more true to nature and to the reality of things, the whole vital force of the idea will, to many, seem to be taken away. Increasingly is it felt that in any great moral conflict the personal element is inevitable.

ANTICHRISTIANISM, *ăn-tĭ-krĭst'yan-ĭzm* [*antichristian*, and *ism*]: belief or conduct opposed to Christianity; opposition to the doctrine of Christ, or of the Christian Church.

ANTICHTHON, *ăn-tĭk'thŏn* [Gr. *anti*, opposite; *chthōn*, earth]: in Pythagorean astronomy, supposititious invisible planet that continually opposes the earth and eclipses the central fire, round which it supposedly revolved. Also, a dweller in an opposite hemisphere.

ANTICIPANT, a. *ăn-tĭs'ĭ-pant* [L. *anticipans*, taking beforehand]: anticipating; in anticipation of: term used of periodic fevers or other diseases in which the paroxysms arrive earlier than their normal period.

ANTICIPATE, v. *ăn-tĭs'ĭ-pāt* [L. *anticĭpātus*, anticipated; *ante*, before; *căpĭō*, I take; F. *anticiper*]: to do or take beforehand; to take first possession; to take before the proper time; to foretaste. ANTIC'IPA'TING imp. ANTIC'-

IPA'TED, pp. ANTIC'IPA'TION, n. *-pā'shŭn*, the act of anticipating; prevention. ANTIC'IPA'TOR, n. one who. ANTIC'IPATIVE, a. *-pā-tĭv*, or ANTIC'IPATORY, a. *-pā-tėr-ĭ*, taking beforehand.—SYN. of 'anticipate:' to prevent; obviate; preclude; expect; preoccupy; foresee; forestall; precede.

ANTICLIMAX, n. *ăn'tĭ-klī'măks* [Gr. *anti*, opposite to; *klimax*, a ladder or staircase]: a figure of speech in which the ideas, instead of successively increasing in grandeur, sink lower.

ANTICLINAL, a. *ăn'tĭ-klī'năl* [Gr. *anti*, against; *klīno*, I bend]: in *geol.*, applied to strata which dip in opposite directions in a roof-like form; opposite of *synclinal*.

ANTI-CORN-LAW LEAGUE: an association which concentrated the efforts of the free-trade party in Britain, and enabled them to carry the repeal of the corn-laws, and establish in practice the principle of free-trade. For the results thus accomplished, see CORN-LAWS: FREE-TRADE, etc. Associations to obtain the repeal of the corn-laws existed in several places before the embodiment of the League—one especially was founded in London in 1834. In 1838, Mr. Cobden and others took the opportunity of the periodical assemblages of the Manchester Chamber of Commerce for exposing the deleterious influence of the restrictive commercial policy on the manufactures and trade of the country. The friends of free-trade occasionally met in Manchester to discuss and promulgate their views; but it was in the beginning of 1839 that the strength of the party was first drawn to a focus, by the appointment of delegates from the manufacturing districts to go to London, and press their principles on the legislature. Mr. Charles Villiers, afterwards pres. of the board of trade, undertook the leadership of their cause in the house of commons, of which Mr. Cobden, who subsequently served it so effectively, was not then a member. Feb. 19, Mr. Villiers moved that the house resolve itself into a committee of inquiry on the corn laws; and again Mar. 12, he moved that certain manufacturers be heard by counsel at the bar of the house against the corn-laws, as injurious to their private interest. The former motion was rejected by 342 to 195; the latter, by 361 to 172. Immediately on the return of the delegates from their unsuccessful effort, the League was formed. Its constitution dates from 1839, Mar. 20, when resolutions were adopted, at a meeting in Manchester, for 'the formation of a permanent union, to be called 'The Anti-corn-law League,' composed of all the towns and districts represented in the delegation, and as many others as might be induced to form associations, and to join the League. The central office of the League was established in Manchester, having in charge the influencing of public sentiment by securing competent lecturers, by obtaining the co-operation of the public press, by correspondence with the local associations, and by various other means. The sum of £5,000 was put at the disposal of the central body, in whose deliberations a contribution of £50 entitled the giver to one vote. The League collected and distributed large sums

of money. Just before its principles became triumphant in the free-trade legislation of 1846, it demanded a quarter of a million pounds, which would have been supplied had it been necessary.

The teachings of the League gained acceptance as presenting a scientific truth in political economy. A majority of the parliament who, in 1841, had been elected for the support of protection, were converted to free-trade, the conversion including the prime-minister, Sir Robert Peel. The key-note to the literature of the League was struck by the beautiful logical exposition of free-trade in General Thompson's *Catechism of the Corn-laws*, which, with other tracts, was profusely dispensed over the country. To serve their cause in the same manner, the protectionist party, at a meeting held in the Duke of Somerset's house, 1844, Feb. 17, founded 'The Agricultural Protection Soc. of Great Britain;' but the exertions of this body seem to have helped rather than hindered. See FREE-TRADE: TARIFF.

ANTICOSTI, *ăn'tĭ-kŏs'tĭ:* island in the Gulf of St. Lawrence, with lighthouses at different parts of the coast between lat. 49° and 50° n., and long. 61°40′ and 64°30′ w.; estimated 3,145 sq. m. Neither to the settler nor to the mariner is A. of value. It is destitute of harbors, the n. shore being mountainous, and the s. low and beset by shoals; while, to increase the danger, the neighboring currents are said to be capricious. The climate is severe; while the surface is an alternation of rocks and swamps. There are hardly any inhabitants save lighthouse-keepers and a few officials, about 300 in all. The island, attached to the Canadian prov. of Quebec has considerable salmon, trout, cod, and herring fisheries, and is a resort for seal and bear hunting. Extensive peat deposits are found in Anticosti. Marl also occurs.

ANTICOUS, a, *ăn'tĭ-kŭs* [L. *antīcus*, in front]: in *bot.*, placed in front of a flower, as the lip of orchids.

ANTIDOTE, n. *ăn'tĭ-dōt* [Gr. *antĭd'ŏton*, a remedy—from *anti*, against; *didōnai*, to give]: a medicine to counteract the bad effects of poison; a remedy for any evil. See POISONS. ANTIDOTAL, a. *ăn'tĭ-dō'tăl*, or AN'TIDO'TICAL, a-*dō'tĭ-kăl*, expelling the effects of poison. AN'TIDO'TALLY, ad. -*tăl-ĭ*. AN'TIDO'TICALLY, ad. -*kăl-lĭ*.

ANTIDROMOUS, a. *ăn-tĭd'rō-mŭs* [Gr. *anti*, opposite to; *dromos*, a course]: running in the opposite direction, as spirals which run alternately in opposite directions; the opposite of *homodromous*.

ANTIETAM, *ăn-tē'tam*, BATTLE OF (Confederate name SHARPSBURG, BATTLE OF): 1862, Sept. 17, west of Antietam Creek, near Sharpsburg. The Union army was commanded by Gen. McClellan, and the Confederate army by Gen. Lee. Gen. Lee had defeated the Union army under Gen. Pope August 29-30, and again at Chantilly Sept. 1, and determined to follow up his successes by an invasion of Maryland and Pennsylvania. He crossed the Potomac near Leesburg on the 5th and 6th of Sept., and occupied

Frederick, where he remained until the morning of the 10th, when he sent 'Stonewall' Jackson with a great part of the army, to recross the Potomac at Williamsport and invest Harpers Ferry from the north and west, while other strong detachments closed in on it from the east and south. With less than one-half his army Lee marched to Hagerstown to await the capture of Harpers Ferry, after which he proposed to re-unite his army and march into Pennsylvania. Five brigades of infantry and a part of Gen. Stuart's cavalry were left to hold the gaps of South Mountain and delay McClellan's movements. Harpers Ferry with its garrison of 12,000 men and 47 guns surrendered to Jackson on the morning of the 15th. Meanwhile Gen. McClellan, at the head of 87,000 men, marched cautiously from Washington, with a front extending from the Potomac river on the left to the Baltimore and Ohio Railroad on the right, thus covering both Washington and Baltimore. He arrived at Frederick on the 13th, where he heard of Lee's intentions, and the division of his forces; and to interpose between these scattered forces, he advanced next morning and drove the Confederates from Crampton's and Turner's Gaps. Lee abandoned his campaign into Pennsylvania, retreated to Sharpsburg, and ordered a concentration of his army at that place. McClellan followed to the banks of the Antietam on the 15th, and on the afternoon of the 16th, Gen. Hooker, at the head of the First Corps, crossed the stream, and after a sharp skirmish, gained a favorable position for an attack upon Lee's left, which was held by 'Stonewall' Jackson, who had joined Lee early on the 16th. Gen. Mansfield, at the head of the Twelfth Corps, followed Hooker across the Antietam during the night. Early the next morning Hooker forced the fighting by an impetuous attack upon Jackson, in which he was soon joined by Mansfield. The result was that before nine o'clock, and after a most terrific contest, in which Jackson says 'the carnage was awful,' the Confederate left wing was driven back, but the Union corps were too much cut up to follow. Mansfield had been killed and Hooker wounded. On the Confederate side, Gen. Starke had been killed. Sumner now came on the field at the head of the Second Corps, and led Sedgwick's division into the woods where the Confederates had been driven, but was repulsed with great loss. Practically the fight on the Confederate left was now over, but in the center the divisions of Gens. Richardson and French, of Sumner's corps, made a determined and successful attack upon the position of the Confederates in a sunken road, now known as 'the bloody lane,' in which engagement Gen. Richardson, on the Union side, and Gen. G. B. Anderson, Confederate, were mortally wounded. On the Union left Gen. Burnside, after two unsuccessful attempts to carry a bridge over the Antietam, one mile south of Sharpsburg, succeeded at 1 P.M., and three hours later advanced on Sharpsburg. He had reached the high ground overlooking the town, driving everything before him, when he was attacked on the left and rear by Gen. A.

P. Hill's division, which had made a forced march from Harpers Ferry, and fell back to the high ground bordering the Antietam at the bridge. Night put an end to further operations. Both armies remained inactive on the 18th, and during the night Lee recrossed the Potomac. The strength of the opposing armies has been variously stated. Gen. McClellan reported his own at 87,164; Gen. Lee reported his own as less than 40,000. The Union strength actually engaged was about 56,000 men, with 301 cannon. The Confederates 37,500 men, with 219 cannon. The Union loss was 2,108 killed, 9,540 wounded, or 20 82-100 per cent.; the Confederate loss, 1,546 killed, 7,752 wounded, or 24 89-100 per cent.

There were more men killed and wounded on either side in this one day's battle than in any other one day of the Civil war. It was the bloodiest day of American history. In the entire campaign from Lee's crossing of the Potomac to his recrossing it the Union loss was 2,671 killed, 11,766 wounded, and 13,542 missing or captured, an aggregate of 27,979; the Confederate loss 1,979 killed, 9,607 wounded, 2,336 missing, an aggregate of 13,922.

Bibliography.—The Count of Paris' *History of the Civil War* (Vol. II., 1876) is from the standpoint of a strong admirer of McClellan, whose staff he was on; F. W. Palfrey's *Antietam and Fredericksburg* (1882) from a lieutenant-colonel of Sedgwick's division, is sharply critical of nearly all the Union generals; John C. Ropes' *Story of the Civil War* (Vol. I., 1894) is from a noted military critic; Michie's *General McClellan* (1901) is from a distinguished engineer officer and professor at West Point; the account in *Battles and Leaders of the Civil War* (N. Y. 1884–8), is by Gen. J. D. Cox.

AN'TI-FEDERALISTS: the first political party in the United States after the separation from Great Britain. The loyalists having been expelled, there was no issue to divide upon till the question of replacing the loose Confederation with a stronger bond came up. The representatives of commerce and capital, and the mass of the educated classes, favored ratifying the Constitution; those who feared that a strong government meant a disguised new kingship, the local leaders who wished to retain preeminence, and the conservatives who thought no evils comparable to those of change, opposed it. The names were in direct opposition to the facts, the Federalists striving to turn the federation into a unified nation, the Anti-Federalists endeavoring to preserve a loose disintegrated federation. The victory of the superior classes was overwhelming, one great cause being that the men who were later the leaders of the Anti-Federal opposition were Federalists for the time being, as they felt that the existing condition of affairs was intolerable. In the organization of the first Congress and executive under the Constitution, the Federalists proper held every post but three, and even those were not technically 'anti' till later. In this Congress, though there was much individual opposi-

tion to the Federalist measures, it was unorganized, and the Anti-Federal spirit could hardly be said to animate a body. Hamilton's scheme for clearing up the public debt was the first point of division. The payment of foreign debts was carried unanimously; that for paying the Continental debt at par was opposed by Madison and others except as to original holders; that for assuming the State debts was bitterly fought as defaming the States' solvency and as buying the support of capital for the Federal government, was carried by only five votes, reconsidered and beaten by the seven votes of the new North Carolina just admitted, again reconsidered and carried by Jefferson's log roll of establishing the new capital on the Potomac. His national-bank scheme (1791, opposed by Madison in the House and Jefferson and Randolph in the Cabinet) and his tariff and excise schemes also excited a growing hostility from this element, which by the time of the 2d Congress (1791, Oct. 1), was becoming a new strict-construction party; no longer opposed to the Constitution as such, but opposed to extending its powers beyond the most literal interpretation of its terms. Jefferson, Madison, and Randolph were now the chiefs of the new party in public office; but Jefferson disclaimed being an Anti-Federalist, based his policy on love of 'republicanism,' as sympathizing with the French revolution, and called the Hamiltonians 'monarchists.' The Republicans and Anti-Federalists comprised the same elements, however, and were based on the same natural division, and Washington's proclamation of neutrality in the European conflict in 1793 fused them into one as the Republicans, later into the Democratic-Republican party.

ANTIFEBRIN, n. *ăn'tĭ-fĕb'rĭn* [L. *anti*, against; *febris*, fever]: a remedy to abate fever; see ACETANILIDE.

ANTIGO, Wis.: county-seat of Langlade county, a northern county of the state. It is situated in the southwestern portion of the county, 96 miles north-northwest of Oshkosh and 207 miles northwest of Milwaukee; and it is on the Spring Brook River and the Chicago and Northwestern railway. It is the commercial centre of an agricultural section of considerable importance, and of a timber region which has contributed largely to Wisconsin's position in marketed forest products. There are located several extensive manufactures of various sorts, including chair, hub, broom-handle, excelsior, veneer, and other factories; also foundries, breweries, railway-shops, and flour, planing and saw mills. Antigo was settled about 1878, and in 1884 was incorporated. Under the provisions of a general law of Wisconsin, its government is administered by a mayor, elected for a two-years' term, and a municipal council. Pop. (1890) 4,424; (1900) 5,145.

ANTIGONE, *ăn-tĭg'ō-nē:* several characters in Greek legend, (1) daughter of Œdipus by his own mother Jocasta, and sister of Eteocles and Polynices. She accompanied her father into exile, and after his death returned to Thebes. Eteocles, the king, had banished his brother

Polynices, who, coming back with an army, engaged him in single combat. Both fell, and Creon, who after their death had become tyrant of Thebes, forbade their interment. When he learned that A. had buried Polynices, he shut her up in a tomb or cave where she died. A son of Creon, betrothed to A., killed himself when her fate became known. (See Sophocle's *Œdipus at Colonus* and *Antigone*); (2) daughter of Eurytion, wife of Peleus, who hanged herself on receiving a false report of her husband's marriage to Sterope; (3) daughter of Laomedon and sister of Priam, who audaciously compared her beauty to Juno's, and was punished by having her hair turned into snakes, which so tormented her that the gods in compassion changed her into a stork.

ANTIG'ONUS: name of many historical persons, of which the most celebrated was the son of Philip of Elymiotis, and one of the generals of Alexander the Great: B.C. 381-301. In the division of the empire which followed the death of his master, A. received the provinces of Phrygia-Major, Lycia, and Pamphylia. Being accused of disobedience by Perdiccas, who wished to gain possession of all the territories left by Alexander, A. entered into alliance with Craterus, Antipater, and Ptolemæus, and declared war against Perdiccas, B.C. 321. In the same year, Perdiccas was assassinated by his own soldiers; but A. carried on the war against Eumenes, to whom Perdiccas had given rule over Paphlagonia and Cappadocia. Eumenes, and afterwards Seleucus, who reigned in Syria, were deposed by A., whose ambition and cupidity grew beyond all bounds. He seized the treasures of Alexander kept at Ecbatana and Susa, which he refused to share with his allies, Ptolemæus, Cassander (son of Antipater), and Lysimachus. All the other generals now allied themselves against him, and a long series of contests took place in Syria, Phœnicia, Asia Minor and Greece, which ended with the battle of Ipsus, in Phrygia, when A. was slain in his eighty-first year.

ANTIGONUS GONATAS, *an-tĭg'ō-nŭs gon'ă-tas:* King of Macedonia: reigned B.C. 277-244; d. B.C. 243, son of Demetrius Poliorcetes, king of Macedonia, and grandson of the great Antigonus. On his father's death, B.C. 283, various claimants for the throne appeared, and much confusion ensued, the result of which was that the royal power fell into the hands of Ptolemæus Ceranus, who perished in a battle with the Gauls, when A. G. became ruler of the country (277 B.C.), and governed precariously in that age of intrigue, dissimulation, and violence, for 33 years. He was twice expelled from his dominions by a hostile force from Epirus, but found refuge and assistance in the Peloponnesus. The close of his career was comparatively peaceful.

ANTIGUA, *ân-tē'ga:* West India island, the most important of the Leeward Islands (see ANTILLES); residence of the gov.-in-chief of the British portion of the group; W. long., between 61° 44′ and 61° 58′; N. lat., between 17° 2′ and 17°

13′. It is about 18 m. across; 108 sq. m. It was first settled, 1632, having till then remained, in fact, uninhabited on account of the great scarcity of fresh water. It has twice suffered severely from earthquakes—1689 and 1843, and of hurricanes, the other heavy scourge of the group, A. has had its f. ll share. Numerous islets, rocks, and shoals bor-
er the shore, so that, generally speaking, access is difficult and dangerous. But St. Johns, cap. and chief town, is at the head of a safe and capacious bay, which unfortunately however, does not admit large vessels. English Harbor is, on the whole, a more commodious port, and has been selected as the station of the Royal Mail steam-packets. It is said to be capable of receiving the largest ships in the British navy.

A. is chiefly of tertiary formation. The s. and w. show grauwacke, porphyry, trap, breccia, amygdaloid, and basaltic greenstone; the n. and e. exhibit calcareous marl and coarse sandstone, interspersed with blocks of limestone; while the interior presents argillaceous strata and irregular beds of coarse flint.

Besides provisions, generally almost sufficient for its own consumption, A. produces large quantities of sugar, pine-apple, molasses, and rum.

Immediately after the passing of the imperial statute for emancipation of slaves, the local legislature, rejecting the probationary state of apprenticeship, proclaimed unqualified freedom of the 30,000 slaves, for 1834, Aug. 1. Pop. (1901), with Barbuda and Redonda, 34,971,

ANTIHELIX, n. *ănt′ĭ-hēl′ĭks* [Gr. *anti*, opposite to, but here in the sense of 'before'; *helix*, anything twisted or convoluted, the ear]: the curved prominence parallel with, and in front of, the helix or external prominent rim of the auricle of the ear.

ANTILEGOMENA, *ăn-tĭ-lē-gŏm′ē-na*, n. plu. [Gr. *antilegomena*, things spoken against]: applied especially to certain books in the New Test., which were finally admitted into the canon, though not universally acknowledged in the early church. Such books included the now accepted Epistle to the Hebrews, II. Peter, II. and III. John, the Epistles of James and of Jude, and the Revelation. Rom. Cath. theologians classify these books under one head, calling them *deuterocanonical*, or forming a second canon [from Gr. *deutero*, second]. No New Test. canon is known to have been formed until the latter half of the 2d century.

ANTILLES, *ân-tĭl′lēz* or *ŏn-tēl′*: term designating generally the whole of the West Indian Islands, except the Bahamas. Generally speaking, they stretch e. from the Gulf of Mexico to about the meridian of the Gulf of Paria; then s. to the Gulf of Paria itself; and lastly, w. to the Gulf of Maracaybo. Primarily, however, they are regarded not as three sections, but as two—the Greater A., to the n. and w.; and the Lesser, to the e. and s. This distinction, which obviously involves considerations of position as well as of

magnitude, will be found to indicate also a difference of organic structure.

The Greater A., reckoning from the w., are: Cuba (independent), Jamaica (Brit.), Hayti (independent), and Porto Rico (U. S.). They extend, in w. long., from 84° 58′ to 65° 40′, and in n. lat. from 23° 9′ to 17° 40′—the higher of these two parallels being only 21′ or about 25 m. within the Tropic of Cancer. On the lowest estimate, the area is 70,000 sq. m. The Greater A. appear to be of primitive formation, presenting lofty granitic mountains. In Jamaica, however, there are many hills of calcareous origin.

The Lesser A. may be divided into two chains—the e., trending round from the e. of Porto Rico to the Gulf of Paria; and the s., stretching away in a direction nearly parallel with that of the Greater A., along the coast of Venezuela as far as the Gulf of Maracaybo. By the Spaniards, followed by some other nations, the latter chain is termed the Leeward Islands, and the former the Windward Islands. In English and French phraseology, however, the Leeward Islands are all those to the n. of 15° n. lat., and the Windward Islands all those s. of that parallel.

In the latter sense of the name, the Leeward Islands, reckoning from the n., come in nearly the following order: Virgin Islands (Danish and British), Anegada (British), Anguilla (British), St. Martin (French and Dutch), St. Croix (Danish), Saba (Dutch), St. Bartholomew (French), St. Eustatius (Dutch), Barbuda (British), St. Christopher's (British), Nevis (British), Antigua (British), Montserrat (British), Deseada (French), Guadeloupe (French), Marie Galante (French), Dominica (British). They extend in w. long. from 65° 30′, at the w. extremity of the Virgin Isles to 61° 23′ at the e. extremity of Dominica; and in n. lat. from 18° 48′, at the n. extremity of Anegada to 15° 10′ at the s. extremity of Dominica. See DANISH WEST INDIES.

The Windward Islands, reckoning from n. to s. and then from e. to w., are as follows: Martinique (French), St. Lucia (British), Barbadoes (British), St. Vincent (British), Grenadines (British), Grenada (British), Tobago (British), Trinidad (British), Testigos (Venezuelan), Margarita (Venezuelan), Tortuga (Venezuelan), Blanquilla (Venezuelan), Buen Ayre (Dutch), Curaçoa (Dutch), Aruba (Dutch). They extend in w. long. from 59° 20′ at the e. of Barbadoes to 70° 11′, at the w. of Aruba; and in n. lat. from 11°, at the s. of Margarita, to 14° 55′, at the n. of Martinique. Their entire area cannot exceed 1,500 sq. m. The Windward Islands, in the Spanish sense of the term, are otherwise called the Caribbees; and hence the sea which they cut off from the open Atlantic is called the Caribbean Sea (q.v.).

The Lesser A., as a whole, appear to be chiefly of coral formation, or of volcanic origin. Many of them contain extinct craters; and, though not destitute of harbors, their coasts are in a great measure inaccessible by reason of reefs.

The A. generally—but perhaps the Lesser more so than the Greater—are subject to hurricanes and earthquakes. Their principal productions are sugar, rum, cotton, coffee, etc. (see the titles of the individual islands).

ANTILOPE: see ANTELOPE.

AN″TI-MA′SONRY: in United States history, (1) the widespread hostility to the Freemasons, as an order whose oaths were contrary and superior to public duty and private morality, excited by the fate of William Morgan in 1826. He was a broken Virginian, who had settled in Batavia, N. Y., about 1824, as a mason by trade, and professing to be a Royal Arch Mason; and in the summer of 1826 was reported to be writing a book to expose the secrets of Freemasonry, to be printed at a local newspaper office. Though the Masons were naturally indignant and distressed, the other citizens regarded it as a catchpenny scheme, and had Morgan remained in view probably Masonry would have suffered little damage. But, unluckily, just at this time suits against him for debt began suddenly to multiply, and bail was either refused or disregarded. Finally on August 11 he was taken to Canandaigua, 50 miles away, on a charge of theft; was released, but at once rearrested for debt; and on the next night, being again released, he was seized and never reappeared. The public at once connected this with the Masonic exposure and threats, and vigilance committees were shortly organized which traced him beyond question, in the hands of abducting parties, to Fort Niagara, an unoccupied United States post at the mouth of the Niagara River. The excitement, increased by the belief that prominent Masons obstructed the investigations, was fanned into flame by the appearance, a few weeks later, of the first part of Morgan's book, the other parts ultimately being published also; entitled *Illustrations of Freemasonry, by One of the Fraternity Who Has Devoted Thirty Years to the Subject;* reprinted under various titles, as *Light on Masonry, Freemasonry Exposed and Explained,* etc. The alleged agents in the abduction were put on trial between January 1827 and 1830, and several were convicted and sentenced, some pleading guilty to save examination as to conspiracy. They could not be held for murder, but popular judgment charged that crime to the fraternity if not to the individuals. Very soon Anti-Masonry had become the one issue of the day. Candidates for local office who refused to withdraw from the order were heavily 'scratched' at elections, and great numbers of lodges had to give up their charters and dissolve. From New York the feeling spread through the Union, and more than 3,000 lodges surrendered their charters before the storm blew over. The governor of New York and a large number of the leading officials and prominent public men were Masons, as now; but in the campaign of 1828 the National Republicans dared not nominate any who belonged to the order. None the less the Anti-Masons formed a regular party, holding a convention at Utica and nominating Solomon Southwick for governor. Wm. H. Seward, Millard Fillmore, and Thurlow Weed first came forward as Anti-Masonic candidates. A body was conveniently found in Niagara

River and said to be Morgan's though of course unrecognizable; and Weed is credited with having replied, when questioned as to its authenticity, that it was 'a good enough Morgan till after election.' The ticket polled 33,345 votes out of 276,583; but it polled some 70,000 in 1829 and 128,000 in 1830, gradually absorbed the National Republican party in the State, and became the chief anti-Democratic organization. A convention was held in 1830 to organize a national party; and in 1831, September, in order to force Clay, who was a Mason, out of the field, it held a convention (in Baltimore) before any of the other parties, and nominated William Wirt of Maryland and Amos Ellmaker of Pennsylvania for the Presidency. The National Republicans, however, supported Clay, and in the election of 1832 Wirt received only the electoral vote of Vermont. The party took no further national action, and with the National Republicans was soon absorbed in the new Whig party, though it retained force enough to compel the Whigs to discard Clay for Harrison in 1833 and 1839. In Pennsylvania, however, allied with the Whigs, it survived till about 1840 and elected a governor Joseph Ritner. (2) Another Anti-Masonic body was formed in 1868 as the National Christian Association, at Pittsburg, Pa., though hostility to Masonry was only one of its tenets; it renamed itself in 1875 the American Party and entered politics. It opposed Freemasonry as 'false religion and false politics,' and urged the prohibition of oath-bound lodges as acknowledging another government than that of the United States.

Bibliography.—For Morgan, see Morris, *History of the Morgan Affair* (1852); Greene, *The Broken Seal, or the Morgan Abduction and Murder* (1870). For political results see Hammond, *Political History of New York;* Hopkins, *Political Parties* (1900).

AN'TI-MISSION BAPTISTS (their own title is 'Old School Baptists'), an American sect founded about 1835, who do not believe in Sunday-schools or theological seminaries, holding that salvation does not depend upon human instrumentalities, but upon divine grace alone.

ANTIMONAN, *ăn'tę-mō-nân'*: a seaport town of Luzon, Philippine Islands, province of Tayabas. It is situated on Lamon Bay, about 100 miles southeast of Manila. Pop. about 11,000.

AN'TI-MONOP'OLY PARTY: an American political organization which in 1884 nominated for the Presidency Benjamin F. Butler (q.v.), on a platform advocating election of United States senators by popular vote, an income tax, the repeal of all tariffs, and the prohibition of land grants to corporations. It united with the Greenback Labor party, the combined vote reaching 130,000 votes in the November election of 1884.

ANTIMONY, n. *ăn'tĭ-mon-ĭ* [mid. L. *antimo'nĭŭm:* F. *antimoine*]: a metallic substance much used as an alloy; the chemical name is *stĭbĭum.* ANTIMONIAL, a. *ăn'tĭ-mō'nĭ-ăl,*

pert. to antimony, or containing it: N. the medicine. AN′TIMO′NIATE, n. *-nĭ-āt*, a salt of antimonic acid. AN′TIMO′NIAT′ED, a. *-āt′ĕd*, made of antimony or mixed with it. AN′TIMON′IC, a. *-ĭk*, or AN′TIMO′NIOUS, a. *-nĭ-ŭs*, of antimony: applied to the acids of antimony. ANTIMONITE, n. *ăn′tĭ-mŏn-īt′*, a salt of antimonious acid; in *min.*, the sulphide antimony which forms the common ore of that metal.

ANTIMONY—symb. *Sb* (Lat. *Stibium*): at. wt. 120.2: a brittle metal of a flaky, crystalline texture, and bluish white color. It easily reduces to powder; it melts at 432° C. and boils at 1450° C.; on cooling it forms rhombohedral crystals isomorphous with those of arsenic. When strongly heated in contact with the air it burns with a white light—combining with the oxygen of the atmosphere, and forming copious white fumes of the teroxide of A., or 'flowers of A.' The metal is a bad conductor of heat and electricity, but may be used, in conjunction with bismuth, in the construction of thermo-electric piles. Exposed to the air at ordinary temperatures, A. does not tarnish or rust; and this property, combined with the hardness of the metal and of its compounds, renders A. of essential service in the useful arts, in the construction of alloys, such as Britannia metal, type metal, antifriction metal, and plate pewter. It is likewise employed in the preparation of the large concave mirrors used in astronomical observations; and in the casting of bells, to make them harder and whiter, and to give them a clearer and stronger sound. A. belongs to the nitrogen group of elements. (See CHEMISTRY.) To type metal it imparts the property of expanding at the moment of solidification thus giving a sharp cast. A. trisulphide (stibnite, or gray A. ore), Sb_2S_3, which is found abundantly in Nevada, Borneo, and New Brunswick, and which is mined also in Hungary, Bohemia, Prussia, and Bavaria, is the principal source of A. It occurs usually in veins, is of leaden gray color, with metallic, sometimes irridescent lustre; it fuses readily. From stibnite metallic A. is obtained by fusion with iron filings. The raw A., thus or otherwise obtained, requires calcination to free it from impurities—arsenic, iron, lead, copper, and sulphur. One of the simplest methods of purification is by charging each of a number of crucibles with the raw A. (or regulus), together with soda, common salt, and pure oxidized antimonial ore. On application of heat the foreign metals become oxidized and scorified, and 'star metal' or nearly pure A. is obtained. Various allotropic forms of the metal are known.

The compounds of A. are numerous: with oxygen it forms (1) the *trioxide*, or *white A. ore*, Sb_2O_3, which has already been mentioned and from which are derived (a) salts like *sodium antimonite*, $NaSbO_2.3H_2O$; (b) salts such as the *trisulphate* $Sb_2(SO_4)_3$; (2) Antimony tetroxide, Sb_2O_4, formed by heating either of the other oxides strongly in air; (3) Antimony pentoxide, Sb_2O_5, by the action of nitric acid on the metal or one of the oxides.

Light yellow powder. It gives rise to 2 classes of salts, illustrated by *potassium antimonate*, $KSbO_3$, and *potassium metantimonate*, $K_4Sb_2O_7$, which correspond with the meta- and pyrophosphates, respectively. The hydride of antimony *stibine*, SbH_3, is highly unstable. Antimony trichloride, $SbCl_3$, is sometimes called *butter* of A. It is generally obtained as an oily liquid, of the consistence of melted butter, and of a golden yellow color. Mixed with olive oil, it is used by gun-makers as *bronzing salt*, to impart a yellow color to gun-barrels. The surface of the metal is afterward polished by a burnisher, or coated with a varnish. The pentachloride, $SbCl_5$, is a fuming liquid. 'Powder of Algaroth' is a basic chloride.

The various compounds of A. are used as medicinal agents, both in human and veterinary practice, especially *tartar emetic* which is potassium antimonyl tartrate $KOCOCH(OH)CH(OH)COOSbO.\frac{1}{2}H_2O$; the antimonyl group -SbO is a monovalent radical. This compound is the active ingredient in antimonial wine. Several cases have occurred where tartar emetic has been used criminally as a poison. Some idea of the importance which the older chemists and physicians attached to A. will be gathered from the following quotations:

Basil Valentine, in his *Triumphant Chariot of Antimony*, says: 'The shortness of life makes it impossible for one man thoroughly to learn antimony, in which every day something new is discovered.'

ANTIMONY-POISONING: a variety of poisoning formerly more common than at present. The mortality is about 40 per cent. The symptoms of acute poisoning resemble closely those of arsenic-poisoning. There is sudden acute gastric gain, with nausea and vomiting, pressure in the breast, and intense sense of anxiety. This is followed by colicky pains and diarrhœa. The pulse becomes small and frequent, later retarded; the respirations diminish in number, the skin is cyanotic, the temperature sinks, and coma and convulsions lead to death. If vomiting develops early, before time has elapsed to permit of the absorption of a large amount of the antimony salt, death is less likely to occur. The treatment should include washing out the stomach, inducing of vomiting, and the use of tannic acid compounds.

ANTINOMIAN, n. *ăn'tĭ-nō'mĭ-ăn* [Gr. *anti*, against; *nŏmos*, law]: one who denies that the moral law is binding on Christians, and affirms that faith alone is necessary to salvation: Adj. relating to. An'tino'mianism, n. *-ĭzm*, the tenets of. Antinomy, n. *ăn-tĭn'ŏ-mĭ*, or *ăn'tĭ-nō'mĭ*, the opposition of one law or rule to another: see Kant, Imm'l.

ANTINOMIANISM *ăn'tĭ-nō'mĭ-ăn-ĭzm:* the doctrine or opinion that Christians are freed from obligation to keep the law as presented in the Old Testament. It is generally regarded by the advocates of the doctrine of justification by faith, as a perversion of that doctrine, upon which it usually professes to be based. From passages of the New

Testament, as Rom. vi., and 2 Pet. ii. 18, 19, it seems that a tendency to A. had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the middle ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by John Agricola. Agricola had adopted the principles of the Reformation; but in 1527 he found fault with Melanchthon for recommending the use of the law, and particularly of the ten commandments, in order to produce conviction and repentance, which he deemed inconsistent with the gospel. Ten years later, he maintained in a disputation at Wittenberg, that as men are justified simply by the gospel, the law is in no way necessary for justification or for sanctification. The 'Antinomian Controversy' of this time, in which Luther took a very active part, terminated in 1540 in a retraction by Agricola; but views more extreme than his were afterwards advocated by some of the English sectaries of the period of the Commonwealth; and, without being formally professed by a distinct sect, A. has been from time to time reproduced, as a tendency, with various modifications. It ought, however, to be borne in mind, that the term A. has no reference to the *conduct*, but only to the *opinions* of men; so that men who practically disregard and violate the known law of God, are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian, have in many cases been men of good life. It is also to be observed that the term A. has been applied to opinions differing very much from each other. In its most extreme sense, it denotes the rejection of the moral law as no longer binding upon Christians; and a power or privilege is asserted for the saints to do what they please without loss of their sanctity; it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty.

ANTINOMY, n. *ăn-tĭn′ō-mĭ*, [L. *antinomia*, a contradiction between laws; Gr. Αντινομια, an ambiguity in the laws].

A conflict of opposed principles (*e.g.* every composite substance is made of simple parts; nothing simple exists) such that the defense of the one leads to the assertion of the other, and vice versa. Each principle is known as a thesis and its contradictory as the antithesis. In the Kantian philosophy the term antinomy is applied to the difficulties which are inevitable to a realistic view of the universe. Realism as a philosophical doctrine makes the mistake of setting up the distinguishable aspects of the world as disconnected things each of which is then regarded as being sufficient unto itself. The parts of the world are thus separated from one another and all the parts from the whole. But parts mean nothing except as interrelated to each other and as a whole. To assert parts to be independent things devoid of relations, or vice versa, is but to find that they are dependent when

we analyze them closely. And to be both independent and dependent at the one time and in the same regard is a contradiction. To separate parts from whole means ultimately the discovery of a similar antinomy. Now the parts of the universe are its facts; their relations are its laws and ideals. These are formed into the continuous world of time and space. As a series of parts these facts in space and time, governed by laws, constitute the finite world; taken as a whole they are known as the infinite. Kant's contention is that if we separate these aspects of the world one from another and from their interconnection as a whole, *i.e.*, if we regard 'things,' laws and ideals, space, time, finite, and infinite as independent and fixed substances, thought must inevitably run into contradictions and impossible paradoxes. His solution of the antinomy is, in principle, to abandon a merely realistic viewpoint and to regard the aspects of the world as interconnected parts of a single whole which embodies itself in the parts and whose parts are continually retained and renewed within it. This 'regulative' conception asks, consequently, what part each aspect plays within the whole; how each is concretely related to every other and how the whole (the infinite) implied in the existence of each and all is discovered and described through the parts (the finite).

ANTIOCH, *ăn'tĭ-ŏk:* ancient cap. of the Greek kings of Syria; the most magnificent of the 16 cities of that name built by Seleucus Nicator (reigned B.C. 306–280). Its situation was admirably chosen. The river Orontes, issuing from the mountains of Lebanon, flows n. as far as the 36th parallel of lat., and then s.w. into the Levant. On the left bank of the river, after it has taken this last direction, and at a distance of 20 m. from the sea, lay the city, in the midst of a fertile and beautiful plain, 10 m. long. The ancients called it 'A. the Beautiful,' 'the Crown of the East,' etc. It received from Strabo the name of *Tetrapolis,* on account of three new sites having been successively built upon, and each surrounded by a wall. Its public edifices were magnificent The principal were: the Palace; the Senate-house; the Temple of Jupiter, burnished with gold; the Theatre, Amphitheatre, and Cæsarium, besides an aqueduct, a public promenade, and innumerable baths. At the beginning of the Roman empire, it was as large as Paris, and for many generations after continued to receive numerous embellishments from the emperors. Nor did its glory fade immediately after the founding of Constantinople, for though it then ceased to be the first city of the East, it rose into new dignity as a Christian city. Ten councils were held in it. Churches sprang up exhibiting a new style of architecture, which soon became prevalent; and even Constantine himself spent a considerable time here, adorning it, and strengthening its harbor, Seleuceia. The Antiochenes themselves, however, brought about the ruin of their beautiful

city. They were famous, above all other people in ancient times, for their biting and scurrilous wit, and for their ingenuity for devising nicknames; and when the Persians, under Chosroes invaded Syria in 538, the Antiochenes could not refrain from jesting at them. The Persians took ample revenge by the total destruction of the city, which, however, was rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the 7th c. In the 9th c. it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The Crusaders besieged and took it, 1098, June 3. At the close of the 13th c., the sultan of Egypt seized it; since then it has undergone a variety of vicissitudes, and at present forms a portion of Syria, in the eyalet of Aleppo. Its modern name is *Antakieh*. In 1872, A. was mostly destroyed by an earthquake, and the pop., which was then estimated about 17,000, was in consequence greatly reduced. Present pop. about 20,000.

ANTIOCH COLLEGE: an American coeducational institution in Yellow Springs, Ohio, founded in 1852 with Horace Mann as its first president. It has an endowment of over $100,000; its grounds and buildings are valued at $250,000; and its library contains 10,000 volumes. In 1906 it had 9 instructors and 80 students, its graduates numbering 267.

ANTIOCHUS, *ăn-tī′ō-kŭs:* a common Greek name, borne by thirteen kings of Syria, four kings of Commagene (a small country between the Euphrates and Mount Taurus), and many other persons of note (see Smith's *Dictionary of Greek and Roman Biography*).

Antiochus Soter, the first of the Syrian dynasty, or Seleucidæ, as they were called from their founder: prob. B.C. 324–261, was the son of Seleucus, the general and one of the successors of Alexander. A. was the fruit of one of those marriages which Alexander celebrated at Susa between his generals and the princesses of Persia. His mother's name was Apama. From this fact we gather the probable date of his birth. For the earlier career of A., see Seleucus. On the murder of his father, B.C. 280, A. succeeded him in his dominions, but he afterwards permitted Antigonus Gonatas to retain possession of Macedonia on his marrying Phila, a daughter of Seleucus. A. was much occupied in wars with the Gauls, who invaded Asia Minor, and, on one occasion is said to have gained a victory over them by the help of his elephants, from which circumstance he derived the name of Soter (Saviour). He was killed in a battle with the Gauls, and was succeeded by his son A. II.

Antiochus III., surnamed the Great, the most distinguished of the Seleucidæ, was the son of Seleucus Callinicus, and grandson of A. II.: d. B.C. 187. In his earlier wars with Ptolemy Philopator, A. was generally successful; and though defeated in a great battle near Gaza, he afterwards, by his victory over the Egyptian general, Scopas, obtained

entire possession of Palestine and Cœle-Syria. In this war he was assisted by the Jews, to whom he granted many privileges. Fearing the power of the Romans, A. at length concluded a peace with Egypt, betrothed his daughter Cleopatra to the young king Ptolemy, and gave her Cœle-Syria and Palestine as a dowry. The formidable enemy which he thus hoped to escape encountered him at a later period of his career. Having conquered Philip of Macedonia, the Romans no longer dreaded a war with A., and accordingly sent him an embassy, demanding the surrender of the Thracian Chersonese, and of the places which he had conquered from Ptolemy, whose guardian the Romans had become. He was entirely defeated by the consul Acilius Glabrio at Thermopylæ, B.C. 191, and was compelled to return to Asia. Having a second time tried the fortune of war, he was defeated by Scipio, who had crossed over into Asia; and very severe terms were imposed on him. He found so much difficulty in raising money to pay the tribute demanded by the Romans, that he was led to plunder a temple in Elymais, when the people rose against him, and killed him. The fate of A was foretold in the Book of Daniel (xi. 18, 19).

ANTIOCHUS IV., surnamed EPIPHANES: (reigned B.C. 175–164): by his tyranny and sacrilege excited the Jews to a successful insurrection under their leaders, Mattathias, Judas Maccabæus, and the other members of that heroic family. The monstrous life of A. is recorded in the books of the Maccabees.

ANTIOCHUS XIII., surnamed ASIATICUS, the last of the Seleucidæ, was deprived of his kingdom by Pompey, who reduced Syria to a Roman prov., B.C. 65.

ANTIPAROS, *ăn-tĭp'ă-rŏs:* (anciently called *Olearos* or *Oliaros*): one of the Cyclades Islands, celebrated for a stalactitic cave. It is separated from Paros by a narrow strait, and forms a part of the eparchy of Naxos. A. is 7 m. in length by about 3 in breadth; it is scantily supplied with water, but the flats in the n. and w. are moderately fertile. Corn and wine are cultivated, but not largely. The principal occupation of the inhabitants is fishing. From Kastron, the only village in the island, the distance to the celebrated grotto is about an hour and a half's ride. This wonderful cave is not alluded to by any Greek or Roman writer whose works are extant, but must have been visited by the curiosity-hunters of antiquity, for, in 1806, Col. Leake deciphered a Hellenic inscription which contained the names of those who had descended into it in ancient times. It is situated in the side of a mountain on the s. coast of the island, which is described as a mass of white marble. The top or entrance of the cave has a striking appearance; but the sloping descent is rather dangerous, on account of the cord by which the traveller holds being extremely slippery from constant humidity. The bottom once reached, and the grotto entered, there is presented to the eye a dazzling specimen of stalactitic formation—the roof, floor, and walls of the various chambers, all glittering with the most gorgeous incrustation, though it is said that the smoke of

the torches, and the constant fingering of visitors, are sullying the primitive purity of the massive columns. It is believed that there are other caves of equal splendor in the vicinity not yet discovered. The height of the known cavern is 80 ft.; its length and breadth more than 300; but it seems the eye can only take in at once a length of 150 ft., and a breadth of 100. The grotto was first made known to the modern world in 1673, by the then French embassador to the Porte, M. de Nointel. Pop. of A. abt. 500.

ANTIPAS: see HEROD ANTIPAS.

ANTIPATER, *ăn-tĭp'ă-ter:* d. B.C. 318 or 319: one of the generals and confidential friends of Philip, king of Macedon: the most celebrated of the many who bore the name A. in antiquity. When Alexander led his troops into Asia, he left A.—who, with Parmenion, had endeavored to dissuade him from the expedition—as governor of Macedonia. A. discharged the duties of this office with great ability, suppressing the insurrections in Thrace and Sparta; but Olympias, the mother of Alexander, who entertained a dislike to A., prevailed on her son to appoint Craterus as regent of Macedonia. Alexander, prompted also, it is supposed, by his own jealousy of A., consented, but died before the change was carried into effect; and A. was left to share with Craterus the government of Alexander's territories in Europe. The government of Macedonia was assigned to him; and soon after, he was called upon to defend himself against an alliance of the Grecian states. With the assistance of Craterus—on whom he afterwards bestowed his daughter Phila in marriage—and to a certain extent of Leonnatus, he succeeded in reducing the allies to subjection. Democracy at Athens was abolished, and a garrison admitted into Munychia, and the leaders of the popular party put to death. When Demosthenes was summoned to the presence of A., he took poison, which for some time he had been carrying on his person, and died in the temple of Poseidon, B.C. 322. This war was followed by another with Perdiccas, who was also his son-in-law, in which A. was again successful. After the murder of Perdiccas in 321, A. was appointed to the supreme regency of the kingdom, and the guardianship of Alexander's children. He died at an advanced age, leaving the regency to Polysperchon, to the exclusion of his own son Cassander.

Others of this name were: 1. A., second son of Cassander, king of Macedonia, who lived B.C. 3d c.—2. A., the father of Herod the Great. He lived in the days of Pompey and Julius Cæsar, was a firm friend of the Romans, and about B.C. 47 was appointed procurator of Judea. He was poisoned in 43 by one whose life he had twice saved.—3. A., grandson of the former, and son of Herod the Great by his first wife Doris, a worthless prince, perpetually conspiring against the life of his brothers, until his trial and condemnation at Jerusalem before Quintilius Varus, the Roman governor of Syria. He was put to death in prison five days before Herod died, and in the same year with the massacre of the innocents at Bethlehem

A. was the name also of various eminent men in ancient times—physicians, philosophers, historians, poets, mathematicians, and grammarians.

ANTIPATHY, n. *ăn-tĭp'ă-thĭ* [F. *antipathie*, antipathy —from Gr. *antipathei'a*—from *anti*, against; pathos, feeling]: a feeling of hatred; natural aversion; dislike. ANTIP'ATHET'IC, a. *-ĭk:* or AN'TIPATHET'ICAL, a. *-ĭk-ăl*, having a constitutional aversion to a thing.—SYN. of 'antipathy': hatred; aversion; enmity; repugnance; ill-will; rancor; malice; malevolence; dislike; disgust; distaste; opposition; contrariety.

ANTIPATHY: term applied to a class of disagreeable sensations felt by some individuals regarding things innocuous or agreeable to the majority of mankind. These peculiarities are no doubt sometimes acquired in early life by injudiciously terrifying children with some object—the mental impression becoming permanent. A large class of persons have an A. to animal food, and from childhood refuse to taste it. In others, the aversion is limited to one kind of meat, as veal or pork; others are averse to eggs or milk. Nor is this feeling a conscious caprice, which an exertion of the will might remove; for it is generally found that contact with the object of the A. is resented by the bodily economy, and symptoms of poisoning are rapidly produced. Some are affected with these symptoms who have no mental aversion to the article. Some medicines affect particular persons dangerously, even when given in very minute doses: a single grain of mercury has been known to induce a profuse salivation, with destruction of the jaw-bones. On others, medicines have a peculiar effect—astringents may purge. Many persons suffer with the most distressing irritation of the nasal and palpebral mucous membranes, produced by the exhalations arising from the fields during the inflorescence of the hay-crop. In others, an asthmatic condition is induced by the same cause. The air of some places has a similar influence on individuals: one gentleman was always attacked with asthma if he slept in the town of Kilkenny, and another rarely escaped a fit of that complaint if he slept anywhere else.

The most remarkable antipathies are those affecting the special senses. Nearly all persons have a loathing at reptiles, but some few *faint* on *seeing* a toad or lizard, others on seeing insects. 'The Duke d'Epernon swooned at sight of a leveret—a hare did not produce the same effect. Tycho Brahé fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at a pig.'

Hearing a wet finger drawn on glass, the grinding of knives, or a creaking wheel, is sufficient to produce fainting in some. *Smelling* musk or ambergris throws some into convulsions; and we have seen how articles of food affect others—often, no doubt, owing to perverted taste. The *touch* of anything unusually smooth has the same effect sometimes. Zimmerman records the case of a lady who was

thus affected by the feeling of silk, satin, or the velvety skin of a peach. See IDIOSYNCRASY.

ANTIPERIODIC, *ăn'tĭ-pē-rĭ-ŏd'ĭk*, in med. agents which tend to prevent attacks of disease occurring at regular intervals, such as the malarial paroxysms. The most prominent of the antiperiodics are quinine and other alkaloids of cinchona, arsenic, and eucalyptus.

ANTIPERISTALTIC, a. *ăn'tĭ-pĕr-ĭ-stăl'tĭk* [Gr. *anti*, against; *peristal'tĭkos*, drawing together all round—from *peri*, around; *stello*, I send]: applied to the vermicular contraction of the intestinal tube when that takes place in direction from behind forwards. AN'TIPERISTAL'SIS, n. *-stăl'sĭs*, the inversion of the peristaltic motion of the intestines.

ANTIPHLOGISTIC, a. *ăn'tĭ-flō-jĭs'tĭk* [Gr. *anti*, against, *phlogi'zo*, I consume or burn up]: applied to medical treatment intended to subdue inflammation; such as bloodletting, purgatives, low diet, etc.: N. a medicine that checks inflammation.

ANTIPHON, *ăn'tĭ-fŏn:* b. Rhamnus, Attica, B.C. 480; son of Sophilus, the Sophist; earliest of the ten Attic orators in the Alexandrine canon: in his youth, the reputation of Gorgias, the most showy and insincere of all the Greek rhetoricians, was at its height. A. soon became convinced of the worthlessness of that oratory which the fashion of the time so highly valued, and resolved to introduce a new and better kind. He labored to make his arguments clear, solid and convincing, so that it might be impossible for the judges who listened to the speeches he wrote to refuse their assent to his propositions. His success was unmistakable. Although he never made a public appearance as a pleader in the courts of justice, but contented himself with writing speeches for others to deliver, he acquired great influence, which he did not fail to exert for the furtherance of his political principles. To him must be attributed the overthrow of the Athenian democracy (B.C. 411), and the establishment of the oligarchical government of the Four Hundred; for although Pisander figured prominently before the people in this revolution, the whole affair, according to Thucydides—one of A.'s pupils in oratory, and a man admirably fitted to judge of such a point—was secretly planned by him. The oligarchical government did not prosper. Dissensions quickly broke out among the Four Hundred, and six months after, Alcibiades, the brilliant demagogue, was recalled. A. was brought to trial for treason, in having attempted to negotiate peace with Sparta. He is said to have made a noble defense of himself. Thucydides affirms that an abler was never made by any man in a similar position. It was his first and last oration. He was condemned to death; his property was confiscated, his house razed to the ground, his remains forbidden interment in Attica, and his children forever declared incapable of enjoying civic privileges. Of the 60 orations of A. which the ancients possessed, only 15 have come down to us. Three

of these are written for others, and are greatly admired for their clearness, purity, and vigor of expression; the remaining 12 appearing to have been intended as specimens of school rhetoric for his pupils, are not so highly esteemed.

ANTIPHONY, n., or ANTIPHONE, n. *ăn-tĭf'ō-nĭ* [Gr. *antiphōnē;* mid. L. *antiphōna*—from Gr. *anti*, opposite; *phōnē*, sound: F. *antiphone:* AS. *antefen*]: the alternate singing of two choirs. ANTIPHONAL, a. *ăn-tĭf'ō-năl*, pertaining to: N. a book of antiphons. ANTIPHON, n. *ăn'tĭ-fŏn*, the hymn sung in parts by turns; same as *antiphony;* the chant of alternate singing in choirs; the repeating, chanting, or singing of versicles or parts alternately.

ANTIPHONY, or ANTIPHONE: among the ancient Greeks, a species of musical accompaniment in the octave, by instruments or voices, in opposition to that executed in unison, which they called *Homophony.* A. (often called ANTIPHON) is also a species of sacred song, sung by two parties, each responding to the other; a practice in the early ages of the Hebrews, Greeks, and Romans. Many of the Psalms of David show that antiphonal singing was then in use. Its introduction into the Greek Church is ascribed to Ignatius, Bishop of Antioch, 2d c.; and Ambrosius, Bishop of Milan, is said to have introduced it into the Western Church, 4th c. The dividing of the antiphonies into verses, with rules regarding the same, is attributed to Pope Cœlestin in 432. Pope Gregory I., 590, prepared the first regular *Antiphonarium* (see *Durandi Rationale Divinorum Officiorum*, Mainz, 1459). It was early a custom, which became common after the 13th c., to date deeds with the beginning words of the A. (*Introitus*), which in those times served for the day of the month and of the week. The Reformed Christian Churches of Germany and England have retained a certain degree of antiphonal singing.

ANTIPHRASIS, n. *ăn-tĭf'ră-sĭs* [Gr. *antī*, opposite; *phrasis*, a form of speech]: the use of words in a sense opposite to their proper meaning; irony. AN'TIPHRAS'TICAL, a. *-tĭ-kăl.* AN'TIPHRAS'TICALLY, ad. *-kăl-ĭ.*

ANTIPODES, n. plu. *ăn-tĭp'ō-dēz* [Gr. *anti*, opposite; *podes*, feet]: those who live on the opposite side of the globe, and whose feet are directly opposite to those of the speaker; the country occupied by such. ANTIPODE, n. *ăn'tĭ-pōd*, one who lives on the opposite side of the globe. ANTIP'ODAL, a. having the feet directly opposite. *Note.*—As the singular ANTIPODE, *ăn'tĭ-pōd*, is now in use, there may be no good reason for objecting to *ăn'tĭ-pōdz* as an alternative pronunciation of the plural.

ANTIPODES, in Geography: inhabitants of any two opposite points of the globe, or in other words, the dwellers at the opposite extremities of any diameter of the earth. From this primary relation, there necessarily arise many secondary relations. A. must be on one and the same meridional circle, separated from each other by half the circumference. Being on one and the same meridional circle, they must differ in long. exactly 180°, with the exception of the

poles themselves, as having no longitude at all: and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take New York, as an example in lat. 40° 42′ 33″ n , and long. 74° 0 3″ w.; its A. must be in lat. 40° 0 3′ s. and in long 254° 0′ 3″ w., or rather in 90° 18 27″ e., which is merely an undistinguishable spot in the Indian Ocean. Take, as another example, London, in lat. 51° 30′ n., and long. 0° 5′ w. Its A. must be in lat. 51° 30′ s., and in long. 180 5 w., or rather 179° 55′ e.—coinciding nearly with a small island to the s e. of New Zealand. This small island, in honor rather of London than of itself, has appropriated the term A. as its own peculiar name.

Between A. in general there necessarily exist also other secondary relations. With reference to the earth's daily rotation, the noon of the one side must be the midnight of the other; while, with regard to its annual revolution, the summer and the autumn of the one side must be the winter and the spring of the other. With respect, however, to the former contrast, some explanation may be required. This, for instance, being Wednesday in London, was last midnight in that city the noon of Tuesday or of Wednesday at A. Island? The answer is, that, according to circumstances, it may be held to be either one or the other. In going eastward—that is, in meeting the sun—one, from day to day, anticipates every noon and every midnight in the proportion of 4 min. of time to 1° of long., or of 12 hours of time to 180° of long.; so that, on reaching A. Island from London by the Cape of Good Hope, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Wednesday. In going westward—that is, in leading, as it were, the sun—one, from day to day, postpones every noon and every midnight in the same proportion as above; so that, on reaching A. Island from London by Cape Horn, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Tuesday. In fact, navigators in opposite directions, meeting at any intermediate point whatever of the earth's circumference, always differ in their computation of time by a whole day, or 24 hours. In two cases, this has been permanently exemplified: the Spaniards at the Philippines, who have come from the e. are a day behind the Portuguese in Macao, who have come from the w.; while, on the n.w. coast of America, the Russians from the w. were a day in advance of the British from the east.

ANTIPOPE, n. *ăn′tĭ-pōp* [Gr. *anti*, against, and *pope*]: a pontiff elected in opposition to the pope canonically chosen. The first A. is reputed to be Felix during the pontificate of Damasus (366–384). Several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otho the Great displaced successively two bishops of Rome; and when Sylvester III. had expelled the simoniacal and profligate pope Benedict IX., Conrad II. king of Germany, brought back this worthless pastor, who hastened to sell his dignity to Gregory VI. There were now consequently, three popes, and their num-

ber was increased to four by the election of Clement II. in 1046. Shortly after, Alexander II. found a rival in Honorius II.; and in 1080 the same unseemly spectacle was witnessed, when Henry IV., emperor of Germany, elevated to the papal chair Guibert of Ravenna, under the title of Clement III., in opposition to his implacable adversary, Gregory VII. But after the death of Gregory, Clement was himself opposed successively by Victor III. and Urban II., and at last died at a distance from Rome, having just beheld the exaltation of Pascal II. as the successor of Urban. During the 12th c. there were several antipopes, such as Gregory VIII. and Honorius III. On the death of the latter, France began to intermeddle in these disgraceful strifes, and upheld the cause of Innocent II. against Anaclet; while the kings of Sicily, on the other hand, more than once set up a pontiff of their own against the choice of the emperors. Between 1159 and 1378, there were four antipopes; but the most remarkable epoch is 'the great schism of the West,' produced by these rivalries in 1378—a schism which divided the church for fifty years. It broke out after the death of Gregory XI., at the election of Urban VI., whom the voice of the Roman people, demanding an Italian pope, and not one who should fix his pontificate, like several of his predecessors, at a distance from Rome, had elevated to the papal throne. The French cardinals objected, withdrew to Provence, and elected a new pope, under the name of Clement VII., who was recognized by France, Spain, Savoy, and Scotland; while Italy, Germany, England, and the whole n. of Europe, supported Urban VI. These two popes excommunicated each other; nor did they even fear to compromise their sacred character by the most cruel outrages and the most odious insults. The schism continued after their death, when the three popes were elected by different parties, all of whom were deposed by the Council of Constance in 1415, and Cardinal Colonna elected in their room, under the title of Martin V. The last A. was Clement VIII.—See INFALLIBILITY OF THE CHURCH: POPE.

ANTIPYRETIC, n. *ăn'tĭ-pī-rĕt'ĭk* [Gr. *anti*, against; *puretos*, fever]: in *med.*, an agent to reduce the bodily temperature in fever. Such agents are in two classes: (1) those which lessen heat production; (2) those which increase the loss of heat. In the first class are such drugs as quinine, salicylic acid and its salts, some of the essential oils, eucalyptol, thymol, etc., antipyrin, phenacetin, acetanilid, etc.; also such drugs as aconite and digitalis which influence the production of heat through circulation. The 2d class is divided into (*a*) those which by dilating the cutaneous vessels permit increased radiation, e.g. alcohol; (*b*) those which by increasing perspiration tend to loss of heat by evaporation, e.g., nitrous ether; (*c*) those that abstract heat from the body, e.g., ice to the surface, cold bath, etc. ANTIPYRIN, a white crystalline powder, tasteless and soluble in water; its name is 1, 2, 3 -phenyldimethylpyrazolone, $HC\begin{smallmatrix}CO.N(C_6H_5)\\ \diagdown\\ \diagup\\ C(CH_3)\end{smallmatrix}\rangle NCH_3$ and

it is prepared, somewhat indirectly, from acetic acid. Melts 113° C. and gives a deep red color with ferric chloride solution. A. is one of the most efficient febrifuges, and not harmful when administered by a competent physician. Serious results and even death have followed its careless use, due to its depressing action on the heart. It is useful whenever it is desirable to reduce the bodily temperature, and in painful affections of the nervous system. The majority of patent nostrums for relief of headache contain either A. or acetanilid, and should, therefore, be avoided, as the ingestion of such powerful drugs in unknown quantities may produce very serious symptoms, much worse than the primary trouble.

ANTIQUARIES, Society of: see Archæology.

ANTIQUE, *ăn-tēk′:* term applied to the works of art of the ancient Greeks and Romans especially their incomparable sculptures. The A. Style in works of art is distinguished by critics from the Romantic or Mediæval, and also from the Modern. The sculpture of the Greeks is characterized by freshness, originality, and ideality; and the phases that it underwent have their parallels in the development of the literature and general culture of that people. In the earliest times, the statutes had a rigid, formal character, and looked more like the idols of barbarous nations than deities in human form; then came stern, Titan-like forms, corresponding with the Prometheus of Æschylus; next, the sculptures of Phidias, Polycletes, and Polygnotus—like the characters in the dramas of Sophocles—present to us humanity in its purest and noblest ideal forms. Then, as Euripides in poetry left the old domain of destiny, and derived motives and action from ordinary human passions, so statuary descended from the ideal, to a closer resemblance to the forms of actual life; as we see in the works of Praxiteles and Lysippus. Afterwards, when Aristophanes introduced comedy, forms of every-day life began to appear in sculpture; and thus a gradual transition was made from the art of the Greeks, which was ideal, in the true sense of the word, to that of the Romans, which was real, monumental, and portrait-like. The Romans were the realists of the ancient world; their indigenous philosophy was of a popular kind; their poetry, so far as it was national, was satire; and their works of art may be regarded as monuments and portraitures of real life.

ANTIQUITIES: see Archæology.

ANTIQUITY, n. *ăn-tĭk′wĭ-tĭ* [F. *antiquité;* L. *antiq′uitas,* ancient time—from L. *anti′quus,* old]: old times; former ages; times long since past. Antiquities, plu. *ăn-tĭk′wĭ-tĭz,* relics of olden times. Antiquarian, n. *ăn′tĭ-kwā′rĭ-ăn,* or Antiquary, n. *ăn′tĭ-kwă-rĭ* [L. *antiquārĭus,* studious of antiquity]: a person who studies the history of ancient things. Antiqua′rian, a. pertaining to antiquity. An′tiqua′rianism, n. Antiquate, v. *ăn′tĭ-kwāt,* to put out of use; to make old. An′tiqua′ting,

imp. AN'TIQUA'TED, pp.: ADJ. grown old; old-fashioned. AN'TIQUA'TEDLY, ad. *-lĭ*. AN'TIQUA'TEDNESS, n. ANTIQUE, a. *ăn-tēk'* [F. *antique*]: old; ancient; N. a remnant of antiquity; a relic. ANTIQUE'LY, ad. *-lĭ*, in an antique manner. ANTIQUENESS, n. *ăn-tēk'nĕs*, ancientness; the appearance of being old.—SYN. of 'antique, a.': ancient; antiquated; obsolete; antic; old; aged.

ANTI-RABIC TREATMENT: see RABIES: HYDROPHOBIA: [PASTEUR].

ANTI-RENTERS: political party in N. Y. 1843-47: see PATROON: VAN RENSSELAER, KILLIAN.

ANTIRRHINUM, n. *ăn'tĭ-rī'nŭm*, AN'TIRRHI'NUMS, n. plu. [Gr. *anti*, like, similar; *rhin* or *rhina*, a snout]: a genus of plants, Ord. *Scroph'ularia'ceæ*, the flowers of most of the species bearing a perfect resemblance to the snout of some animals. See SNAPDRAGON.

ANTISCIANS, n. plu. *ăn-tĭsh'ĭ-ănz*, or ANTIS'CII, *ăn-tĭsh'ĭ-ī* [L. *antiscii*—from Gr. *anti*, opposite; *skĭă*, a shadow]; the inhabitants of the earth living on opposite sides of the equator, whose shadows at noon fall in contrary directions.

ANTISCORBUTIC, a. *ăn'tĭ-skŏr-bū'tĭk* [Gr. *anti*, against, and *scorbutic*]: good against the scurvy: N. that which is good against scurvy. See SCURVY.

ANTI-SEMITIC MOVEMENT: recent movement in Europe opposing the Jews as alien by race and religion to the peoples among whom they dwell. In Germany, at its first congress (1895, June), the anti-Semites demanded the exclusion of all persons of Jewish connection from the professions, the army, the press, from public schools, and from the privilege of acquiring property or carrying on business under German names. In Switzerland (1893) a law was passed forbidding the killing of animals according to the Talmud, by bleeding before the death-blow. In France, the party gained some power after the Panama canal scandals (1893), and the second trial of Capt. Dreyfus (1899) stirred up bitter sentiments. The movement in Russia has assumed a more brutal character than in Germany, and thousands of Jews have fled to the United States, Spain, and elsewhere.

ANTISEPTIC, *ăn'tĭ-sĕp'tĭk* [Gr. *anti*, against; *septos*, putrid]: a substance that prevents or arrests putrefaction and analogous fermentive changes: ADJ. opposing putrefaction. It has been proved that putrefaction (q.v.), fermentation of grape-juice (*vinous fermentation*), of milk (*lactic fermentation*), and many, though perhaps not all, other fermentations, depend upon the presence of microscopic vegetable organisms. See GERM THEORY. To prevent these processes, then, it is necessary either (1) to exclude these organisms altogether; or (2) to interfere with conditions which permit of their development; or (3) to destroy their vitality.

(1) These organisms, or their germs, are present in ordi-

nary air; but it has been shown by Pasteur, Tyndall, Lister, Roberts, and others, that if air be filtered through cotton wool, or (if moving slowly) through a fine bent tube, it may be allowed to come in contact with putrescible substances, if these themselves contain no living organisms or germs, without causing putrefaction. This method, however, has had no important practical applications.

(2) Their growth may be arrested (*a*) by a low temperature. Thus may be kept for long periods or transported great distances in chambers cooled to near the freezing-point. Carcasses of the long-extinct mammoth, with the flesh still present, have been found in the ice-cliffs of Siberia. The longer time that meat, milk, etc., keep in cold than in hot weather is familiar. (*b*) By absence of moisture. Thus, if the contents of an egg be thown out on a plate, and thoroughly dried in an oven, the whole becomes of a hard, horny consistence, and may be kept in this state for years. If soaked in water, it will soon begin to putrefy. In the same way meat may be kept fresh by thoroughly drying it.

(3) The vitality of these organisms may be destroyed (*a*) by heat; e.g., meat and other eatables can be preserved for an indefinite time if they are boiled and hermetically sealed when still hot in tin or glass vessels (see PRESERVES); (*b*) by various chemical substances. Some of the most important are common salt and saltpetre, used in curing fish, pickling meat, etc.; alcohol, in preserving zoölogical specimens, vegetable essences, fruits, etc.; sulphurous acid, boracic acid, and arsenious acid; many salts, as chloride of zinc (Burnett's solution, q.v.), permanganate of potash (Condy's fluid, see under MANGANESE), sulphate of copper (blue vitriol), corrosive sublimate, nitrate of silver; chlorine (given off by chloride of lime), iodine, iodoform (CHI_3), glycerin, eucalyptus oil, thymol, creosote, carbolic acid, salicylic acid, tannic acid, quinine, charcoal (both vegetable and animal), dry mold, used in the earth-closet system. See SEWAGE, EARTH-CLOSET. All these substances act directly or indirectly as poisons to the organisms which produce putrefaction, etc.; most of them are either poisonous or very unpalatable to man, and cannot therefore be used in preserving food. Many of them are, however, used in the arts to arrest the decomposition of putrescible substances; e.g., in the manufacture of size for writing-paper from scraps of hides, sulphite of soda or antichlore, containing sulphurous acid, is added; hides are preserved by salt, or, when tanned, by tannin, a compound of tannic acid; timber is found less liable to decay if charged with an antiseptic, such as sulphate of copper, chloride of zinc, corrosive sublimate, or creosote. It is placed in a steam-box, so that the air contained in its pores is replaced by steam; the whole casing is then closed tight, and allowed to cool; the steam condenses and leaves a vacuum in and around the wood. If one of these substances is then introduced, it finds its way into the innermost pores of the timber. See WOOD-PRESERVING.

ANTISEPTIC SURGERY.

Among the most important purposes for which antiseptic methods and substances are used are the *prevention of infectious diseases*, and the *treatment of wounds*. The organisms which cause infectious diseases are closely analogous to those that lead to putrefaction, and can be rendered inert, while still outside the human body, by a proper use of the chemical antiseptics or by exposure to a high temperature. Thus anything that has come near the patient suffering from an infectious disease, also the discharges from his person, can be made harmless by carbolic acid, chloride of zinc, or some other antiseptic; his bedding is roasted in an oven at a temperature of 212° F. or more; the room where he has been treated is fumigated with chlorine, sulphurous acid, or formaldehyde, the walls and floors and the furniture are washed with a solution of corrosive sublimate, and so the disease is prevented from spreading. This is one of the chief aims of medical practice at the present day. See DISINFECTANTS.

Many of the evil effects which follow wounds and surgical operations are due to the presence of microscopic organisms (see PYÆMIA); and the effects of their antiseptic treatment, introduced by Lister, have been marvellous. See ANTISEPTIC SURGERY. In surgery at the present day the principle of antiseptics has, however, been largely superseded by that of asepsis (q.v.), or the observance of strict cleanliness, whereby the access of pus-forming microörganisms to the wound is prevented.

ANTISEPTIC SURGERY: is a method of treating wounds and of performing operations, the object of which is to prevent the bacteria which may enter the wound, or which may be found adhering to objects that may come into contact with the wound, from developing or from multiplying, by killing them or by making them harmless. This object is attained by sterilization, in one of its numerous forms.

In order to understand the meaning of antiseptic or aseptic methods it is necessary to have a clear idea of disinfection and sterilization. By disinfection is meant a method by which we can kill or so prevent the development of certain pathogenic bacteria that they are no longer capable of injuring the organism. The means by which we disinfect the field to be operated upon,—the hands, instruments, etc., which are to come in contact with the wound,—are either *mechanical* (cleansing, scrubbing), *chemical*, or *thermic*. The thermic, or heat-disinfection, which alone has the power to certainly destroy and make innocuous the poisonous, is also called sterilization. It is self-evident that only the dead material which comes into contact with the wound can safely be made germ-free by sterilization. Living tissues cannot stand boiling or such high temperatures as are required to kill bacteria and their spores. Infection from the air has been found to be almost harmless, rarely occurs, and is now regarded as a negligable quantity by surgeons, excepting some rare instances. There remain, then, only the hands of the

surgeon, of his assistants, and the skin of the patient to be operated upon which cannot be sterilized by heat. Hence we must try to make them as free from germs as possible by mechanical and chemical means.

Upon antiseptic surgery, or rather upon aseptic surgery, depends the great progress which has been made in operative work since the year 1868 when this method was first introduced by Mr. Joseph Lister. The writer of this article was a student at the university of Heidelberg when the then Mr. Joseph Lister made his first visit, demonstrating his method at the Academic Hospital of Heidelberg. Lister, now living in London at the age of eighty, and generally ranked as one of the greatest benefactors to humanity, by virtue of his discovery of antiseptic surgery, has been honored the world over and now bears the title of Lord Lister. His theory and practise are based upon the work of Schwann and Pasteur who proved that putrefaction and fermentation depend upon minute organisms. These are also known as micro-organisms in general, or as bacteria and cocci many of them being the producers of toxins, which cause fevers and many forms of disease, hence they are now called pathogenic. Lister started with the idea that these disease-producing germs float in the air and alight upon open wounds. Thus he conceived the idea of purifying the air in operating rooms, by means of strong carbolic acid spray and of preventing the entrance of these germs in the air from entering the wound after an operation by means of a protective dressing also containing strong chemical antiseptics.

It was mainly the work of the Germans, based upon the epoch-making discoveries of Koch which led to the abandonment of the original Listerian antiseptic treatment of wounds. In its place we now practice the *aseptic* wound treatment which we are enabled to do by the use of various methods of sterilization. The antiseptic treatment is now only used in such cases which cannot surely be made aseptic or sterile before the operation. Let it be clearly understood, however, that the aseptic operative technique is impossible, without the antiseptic and that our present method is a combination of antisepsis and asepsis. Our present method came into vogue about the year 1888 and was based on the work of Trendelenburg, Victor von Bruns and von Mikulicz, whose work in turn rests upon Robert Koch's researches, which must be considered the essential foundation of modern bacteriology. The last consequences of the aseptic technique were most logically drawn by Kocher, and he also practically demonstrated their usefulness and application in his Clinic at Berne in Switzerland. In America Nicholas Senn, and Christian Fenger of Chicago, Fredk. Dennis of New York, and A. C. Bernays of St. Louis, by their writings and by clinical instruction did much towards spreading the gospel of asepsis and of promoting its use. Antiseptic and aseptic surgery are now

universally used in all hospitals, and the great benefits to mankind are no longer in doubt. The most successful surgeons are those who can apply the practice of asepsis effectively in their work and it is recognized as a fact that asepsis is the first essential of successful surgery the world over. The mortality following surgical operations, has been so much reduced that the terrors of surgery have to a great extent been abolished and that the great advantages to be gained by early and prompt operation can now be frequently achieved. The public as well as physicians demand operations more readily and do not wait until the disease has so far invaded the organism and run down the patient that the chances of recovery are infinitesimal. The only harm that has come in the wake of antiseptic surgery is that the safety of operations has become so certain that young surgeons, not sufficiently well grounded in anatomy and physiology, are seduced by the brilliant results to undertake operations of such magnitude early in their career as are not warranted by their qualifications and experience. In fact with the rise and growth of asepsis the responsibilities of the surgeon have grown, and untrained surgeons are more dangerous, relatively speaking, to suffering men and women than they formerly were.

The methods of antiseptic wound treatment differ slightly in various hospitals but the following may be considered a fair description of the technique in use at the best hospitals of the present time. The object of the method is the prevention of infection; in other words, the entry of pathogenic germs into wounds (1) during the operation itself; (2) during the process of repair or healing. During the operation an infection may take place by germs entering from the air, or by contact with unclean or infected matter. It has been stated above that the air is as a rule not a bearer of pyogenic or infectious germs and that the dust has not been found to harbor germs in great numbers floating in the air. The danger is much greater from particles of fluid or minute drops of liquid which may be in the air temporarily, such for instance as are expectorated from the mouth or the nose during the act of sneezing or speaking. This danger is avoided by mouthmasks which are worn by all persons within the environs of the field of operation.

Infection by contact, on the other hand, may be brought either directly or indirectly into touch with the field of operation. Hence the room in which the operation is done and all things in it,—the floor, the ceiling, all the furniture, etc.—must be so constructed as to be sterilized by heat, as must also be all the clothes worn by the patient, the nurses and the surgeons. An important source of infection, which is almost uncontrollable, is found in the minor errors of asepsis by which both the living and dead material may become infected, and thus in turn may infect the wound itself (by unnoticed or unobserved contact with some object living or dead which may have escaped sterilization). To guard against these

errors we must place the dead material which is to be used during an operation into suitable sterile vessels kept for that purpose. The living (organic) substances that may come into play, the environs and clothes covering the field of operation, the patient's clothes, the skin of the patient, as well as the operator, his assistants and attendants must be made as free from germs as is possible and must be kept protected from the contact with all possible sources of infection. It is customary to cover the patient after the final mechanical and chemical scouring and scrubbing, all but the part of the skin to be cut into, with sterile clothes. In order to keep off dangers emanating from the head, such as occur with coughing, vomiting, etc., a shield is placed, separating the anæsthetizer and the patient's mouth, nose, etc., from the seat of the operation. This shield must be sterile and must be of some impermeable material, not cloth because vomiting might wet it and thus penetrate and make it unsafe. In order to protect the operator and his assistants and nurses from coming in contact with any material not securely free from germs, they wear a costume which has been specially designed and made of such material as can be frequently sterilized by superheated steam, without losing its firmness or its durability. This costume is fastened on, together with a cap mask or face-piece, by a nurse wearing sterile costume. Finally suitable sterile gloves made of thin rubber may be used and are used by the majority of operators, who think from their use they derive additional security. Some there are who never use gloves, relying on cleaning and scouring methods which have been found safe by them, and who wish to have the use of all their finest tactile senses during delicate operations. The question as to whether gloves should always be used by all operators is still under discussion. There are so many pros and cons that it is not likely that a unanimous practise will be arrived at in the near future. By the methods just sketched in the previous paragraphs, and by other similar precautionary measures, a high degree of freedom from infection has been reached, but all efforts are still imperfect and the danger of infection is not yet absolutely excluded, even under the most painstaking and apparently faultless asepsis.

After the operation is over, there remains the second possibility of infection—the period of the healing or repair of the wound. During this time bacteria may also enter the wound, but this danger is remote and a secondary infection is not near as perilous or serious as primary infection. The most ideal means to prevent this accident is the complete closure and sealing of the wound whenever possible and the least possible meddling with the dressings. The ideal method is to secure complete healing of the wound under a single wound dressing, applied at the close of the operation and removed several days or weeks later when all the tissues are healed and the wound is permanently closed. Infection of this kind, occurring during

the healing of the wound, after the actual operation is over, may be caused (1) by stitch canals, (2) by drainage openings, (3) by endogenous infection. The first two kinds of infection are caused by bacteria that normally inhabit the deep layers of the normal skin. These are only in rare instances known to be very toxic, and to produce dangerous fever and suppuration. By endogenous infection, a form of autoinfection is meant, that kind of infection which may follow ulcerating tumors, or the very rare form of hæmatogenous infection, which latter form is caused by germs in a distant part of the body causing an infection by way of the blood or lymph vessels. Finally for a better understanding of the distribution of germs on earth we must remember that densely populated districts, cities, and (in the latter) tenement houses, are much more dangerous places to have operations performed in than the country. Pathogenic microbes abound in densely inhabited regions and are scarce in mountainous regions or the desert. The best places to have operations performed are hospitals, recently built, with a view single to the purpose of avoiding infection. In the construction of modern hospitals, materials are used which can be cleansed by heat and strong chemicals, and where all corners or crevices affording shelter or nutrition for bacteria are avoided.

ANTI-SLAVERY, n. *ăn'tī-slā'vėr-ĭ* [Gr. *anti*, against, and *slavery*]: hostility to slavery. See ABOLITIONISTS.

ANTI-SLAVERY SOCIETY, THE AMERICAN: organized in Philadelphia 1833, Dec.; disbanded after the accomplishment of its mission 1870, Apr. 9. The chief object of the soc. was the entire abolition of slavery in the United States; and it pledged itself to strive to elevate the character and condition of the colored people, by encouraging their intellectual, moral, and religious improvement, and by removing public prejudice, that they might, according to their intellectual and moral worth, share an equality with the whites of civil and religious privileges. But it further and emphatically declared that it would never countenance the slaves in attempts to vindicate their rights by resorting to physical force. After its organization was completed, the soc. published a 'Declaration of Sentiments,' in which it further expressed the views of its founders on the question of slavery, and noted some of the measures determined on for the accomplishment of its object. The successive presidents of the soc. were Arthur Tappan, Lindley Coates, William Lloyd Garrison, and Wendell Phillips, and among its other officers and active promoters were Benjamin Lundy, Lucretia Mott, William Jay, John G. Whittier, Abby Kelly Foster, Gerritt Smith, Samuel J. May, Owen Lovejoy, and Edward Beecher. The soc. encountered hostility not only in political but in social and religious circles from its organization, and till the civil war began to establish unalterably the principles for which its members labored at the risk of their lives,

the soc. was constantly beset by danger, trouble, and malevolence. The Emancipation Proclamation and the ratification of the 13th, 14th, and 15th amendments to the federal constitution were the substantial fruits of a long and heroic struggle for the oppressed. See SLAVERY.

ANTISPASMODIC, a. *ăn'tĭ-spăs-mŏd'ĭk* [Gr. *anti*, against; *spasmos*, a convulsion or spasm]: applied to medicines that have power to allay muscular spasms. See SPASM.

ANTISTHENES, *ăn-tĭs'thē-nēz:* founder of the Cynic school of philosophy; son of A., an Athenian. He fought in his youth at Tanagra (B.C. 426), survived the battle of Leuctra (B.C. 371), and d. at Athens at the age of 70. After listening to the teaching of Socrates, he gave up rhetoric, which he had followed at first as a disciple of Gorgias, and applied himself wholly to philosophy. He was present at the death of Socrates, and never forgave his persecutors. A. held that virtue mainly consists in voluntary abstinence from pleasure, and in a stern contempt of riches, honors, and even learning, but in his condemnation of pleasure, he excepted such as springs from the soul, or is founded on true friendship. In consistency with his teaching, A. lived an austere, self-denying life, appearing a beggar, clad in ragged garments. The singularity affected by A. gained many imitators, and among them Diogenes, who chose to live in a tub, and surpassed the master himself in Cynic practice. After the death of Socrates, A. taught moral and practical philosophy in the Athenian gymnasium, Cynosarges, from which, it is said, his school derived its title. His writings—among them a polemical work against Plato—have mostly perished. Such fragments as remain have been collected by Winckelmann (*A., Fragmenta*, Zurich, 1842). Ritter classes A. with the 'imperfect Socraticists.'

ANTISTROPHE, n. *ăn-tĭs'trō-fē* [Gr. *anti*, opposite; *strophē*, a turning]: in *anc. poetry*, the stanza of a chorus or ode succeeding the strophe; in dancing around the altar, the *strophē* was sung while turning from the right to the left, and the *antistrophe* in turning from the left to the right—otherwise the former in turning from east to west, and the latter in turning from west to east. AN'TISTROPH'IC, a. *strŏf'ĭk*, of or pertaining to.

ANTITHESIS, n. *ăn-tĭth'ĕ-sĭs*. ANTITH'ESES, n. plu. *-ĕ-sēz* [Gr. *antithĕsis*, placing in opposition—from *anti*, against; *thĕsis*, a placing]: opposition or contrast in words or sentiments. ANTITHETIC, a. *ăn'tĭ-thĕt'ĭk*, or AN'TITHET'ICAL, a. *-ĭ-kăl*, being in contrast; containing opposition of words or sentiments. AN'TITHET'ICALLY, ad. *-lĭ*.

ANTITHESIS: figure of speech in which words are placed in direct opposition to each other to produce a strong contrast. Thus Lessing, in criticism on a book, says: 'It contains many good things, and many new; but the good are not new, and the new are not good.' A., naturally and

moderately employed, gives liveliness to style; but becomes wearisome when too often repeated.

ANTITOXIN, *ăn-tĭ-toks'ĭn:* a substance elaborated in the blood during the course of certain of the defectious diseases, the action of which is to antidote the toxins formed by the microörganisms causing the disease. This is one of Nature's modes of protection against disease and the principle has been utilized as a means of cure. The use of antitoxin is applicable in the prevention and treatment of only a few of the infectious diseases—notably diphtheria and tetanus, or lockjaw. In the affections in which it is not applicable Nature probably employs some other mode of cure, as, for example, stimulating the phagocytes (q.v.) to greater activity. Antitoxin, as used in the treatment of disease, diphtheria for example, is obtained from the blood of the horse. The animal is subjected to repeated injections of increasing amounts of a culture of the diphtheria bacillus. In the effort to destroy the toxins of the bacilli so injected, an increasing quantity of antitoxin is found in the animal's blood and finally this is produced in excessive amount, far greater than was needed to antidote the toxins elaborated by the bacilli contained in the last injection. Blood is then drawn from the animal which has been thus rendered immune to the action of the diphtheria bacilli, and the serum, freed from the corpuscles, but containing the antitoxin, is injected into the blood of a person suffering from diphtheria. The antitoxin it contains supplements the action of that formed at the time in the human body which, in the case of a severe infection, is insufficient, unaided, to antidote the poison of the disease. When used in the case of one who has been exposed to contagion, but has not yet shown symptoms of the disease, it acts as a preventive. In the case of tetanus this is the chief value of the antitoxin, for after the disease has once developed it is seldom efficacious in effecting a cure.

ANTI-TRADES: name given to upper tropical winds, because blowing in directions opposite to trade-winds.

ANTITRINITARIAN: one who denies the doctrine of the Trinity. An A. differs from a Unitarian only in this respect, that his objection to the doctrine in question is made on philosophical, while that of the latter is made on theological grounds. A Unitarian (at least according to the strict usage of former times—the theological limits of Unitarianism have now become more vague) is one who accepts the Bible as inspired, but does not find in it the doctrine of the Trinity; an A. is, or may be, a philosophical theist who denies the inspiration of Scripture. See UNITARIAN: SOCINIAN.

ANTITROPAL, a. *ăn-tĭt'-rō-păl*, or ANTIT'ROPOUS, a. *-pŭs* [Gr. *anti*, against; *tropĕō*, I turn]: in *bot.*, at the extremity most remote from the hilum, as the embryo—or inverted with respect to the seed, as the radicle.

ANTITYPE, a. *ăn'tĭ-tīp* [Gr. *anti*, against; *tupos*, a

pattern]: the reality, of which the resemblance or pattern is called the *type*—thus, the paschal lamb is called the *type*, and Christ the *antitype*. See TYPE. ANTITYPICAL, a. *ăn'tĭ-tĭp'ĭ-kăl*, that which explains the type. AN'TITYP'ICALLY, ad. *-lĭ*.

ANTIUM, *ăn'shĭ-ŭm:* one of the most ancient cities of Latium; stood on the coast 34 m. s.s.e. from Rome. Favorably situated for commerce and piracy, it became, under the Volscians, into whose hands it had fallen, one of the most powerful enemies of rising Rome, until finally subdued (B.C. 338). It became a favorite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces; such as the Apollo Belvedere, and the Borghese Gladiator. It was the birthplace of the emperors Caligula and Nero; and the latter constructed a splendid port by means of two moles inclosing a basin two m. in circumference. A. was completely destroyed by the Saracens during the middle ages; and it was only in the 17th c. that the modern village of PORTO D'ANZO arose, the population of which does not exceed 500.

ANTIVARI, *ân-tē'vâ-rē:* seaport 18 m. n.w. of Scutari, formerly of Albania, but on the coast-district assigned to Montenegro by the Treaty of Berlin in 1878; it has a good harbor, and the first railway in Montenegro connects it with Niksic. Pop. about 7,000.

ANTLER, n. *ănt'lėr* [F. *andouiller*]: a branch of a stag's horn; one of the complete horns. ANTERLED, a. *ănt'lėrd*, furnished with antlers.

ANTLIA, n. *ănt'lĭ-ă* [L. *antlĭă*, a pump]: the spiral trunk with which butterflies and other lepidopterous insects suck of the juices of flowers. It 'is formed by the elongated slender maxillæ, still characterized by the minute palpi at their base. The inner margins of the maxillæ are concave, and the edges of the channels are in close contact, or are confluent, so as to form a canal along which the juices of the flowers can be pumped up into the mouth. The labial palpi are of large size, and defend the antlia when it is retracted and coiled up.' In *astron.*, Antlia is an abbreviation for *A. Pneumatica* (the air-pump), one of the southern constellations introduced by Lacaille.

ANTLIATA, n. pl. *ănt'lĭ-ā'ta* [L. L. furnished with a sucker, like a pump]: name given by Fabricius to the Dipterous order of insects, from their feeding by means of a sucker or pump (see ANTLIA); but the term *antlia* is now confined to the spiral sucker of the Lepidoptera, and the use of A. as a synonym for Diptera would be misleading.

ANT-LION: the larva of an insect (*Myrmeleon formicarium*) of the order Neuroptera, remarkable for its habits. It is not known in Britain, is more common in the s. of Europe than in the north, is found in the U. S. from Maine to Florida. The perfect insect is about an inch long and has a considerable general resemblance to a dragon-fly. The larva is rather more than half an inch long;

it has a very large abdomen, and a small head, which, however, is furnished with two very large incurved mandibles. It has six legs, but is incapable of rapid locomotion, and generally moves backwards. It feeds upon the juices of insects, particularly of ants, in order to obtain which it excavates with the greatest ingenuity a funnel-shaped hole in sandy ground, and lies in wait at the bottom, all but its mandibles buried in the sand. Insects which approach too near to the edge of the hole then become its prey, by the loose sand giving way, so that they fall down the steep slope. If they do not fall quite to the bottom, but begin to scramble up again, the A. throws sand upon them by jerking its head, and so brings them back. It employs its head in the same way to eject their bodies from its pit, after their juices have been sucked, and casts them to a considerable distance; and by the same means throws away the sand in excavating its hole, first plowing it up with its body, and then placing it upon its head by means of one of its fore-legs. It always begins by working round the circular circumference of its future hole, and gradually narrows and deepens it; turning quite round after each time that it works round the hole, so as to employ next time the fore-leg of the other side.

ANTOMMARCHI, *ân'tom-mar'kē*, Francesco: b. Corsica, in the second half of the 18th c.: d. 1838, Apr. 3: a well-known physician, who left his situation in a hospital at Florence, to accept appointment as private physician to Napoleon Bonaparte when banished to St. Helena. The ex-emperor grew attached to him, and bequeathed him 100,000 francs. In 1821, A. returned to Europe, and, 1826, published at Paris *Les Derniers Moments de Napoleon*. Afterwards he was accused of publishing as his own anatomical drawings, copies from plates by another physician. Suspicions, seemingly not ill-founded, were excited also as to the genuineness of a cast of Napoleon's head which he published in Paris. This cast purported to have been taken on Napoleon's death-bed, but was violently disputed by phrenologists. About 1836, he emigrated to America, and d. at San Antonio, Cuba.

ANTONELLI, *ân-to-nĕl'ē*, Giacomo, Cardinal. 1806, Apr. 2—1876; b. Somnio, a village near the Pontine Marshes. His father, a woodcutter, sent A. to be educated at the Grand Seminary of Rome, where he proved himself one of the cleverest students of his time. He gained the favor of Pope Gregory XVI., who named him a *prelato*, and gave him some excellent ecclesiastical appointments. In 1841, A. became under-sec. of state to the Ministry of the Interior; in 1844, second treasurer; and in the following year, finance minister of the two Apostolic Chambers. Pope Pius IX. having become pope, 1846, raised A., during the next year, to the dignity of cardinal deacon of St. Agatha alla Suburra. In 1848, A. was president and minister of foreign affairs in a liberal cabinet, which framed the famous *Statuto* or Constitution, proclaimed 1848.

ANTONINUS.

ANTONINUS, *ăn-to-nī'nŭs*, MARCUS AURELIUS, Roman emperor: 121, Apr. 20—180, Mar. 17 (reigned 20 yrs.); b. Rome; son of Annius Verus and Domitia Calvilla. His original name was Marcus Annius Verus. On the death of his father, he was adopted by his grandfather, who spared no pains to render him pre-eminent in every art and science. His fine qualities early attracted the notice of the emperor Hadrian, who used to term him, not *Verus*, but *Verissimus*, and who conferred high honors on him, even while a child. When only seventeen years of age, he was adopted, with Lucius C. Commodus, by Antoninus Pius, the successor of Hadrian: and Faustina, the daughter of Pius, was selected for his wife. In the year 140 he was made consul; and from this period to the death of Pius, in 161, he discharged the duties of his various offices with the greatest promptitude and fidelity. The relation between him and the emperor was most warm and familiar. On his accession to the throne, he strikingly illustrated the magnanimity of his character, by voluntarily sharing the government (which Pius had left in his last moments, and the senate offered to him *alone*) with young Commodus, who thenceforth bore the name of Lucius Aurelius Verus, and to whom he gave his daughter Lucilla in marriage. Towards the close of 161, the Parthian War broke out, and Lucius, a young man of vigorous bodily habits, was sent to the frontiers of the empire, to repel the incursions of the barbarians; but intoxicated with the enervating pleasures of the East, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant Cassius, who gained several brilliant victories. Lucius returned to Rome (166), and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was revelling in the most extravagant licentiousness. In the mean time, Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Catti waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries in which were kept the supplies of corn, and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni, and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube, was humbled, and they were compelled to sue for peace in 168. In the year 169 Lucius died. The contest was renewed in 170, and may be said to have continued with little intermission during the whole life of the emperor. Although fond of peace, both from natural

disposition and philosophic culture, he displayed the sternest vigor in suppressing the revolts of the barbarians; but in order to accomplish this, he had to enrol among his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His headquarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently nearly annihilated in crossing the Danube. The same fate befel the Jazyges; but the most famous as well as the most extraordinary of all his victories, was the miraculous one gained over the Quadi (174), which gave rise to copious discussion among Christian historians and others. Dion Cassius's account is, that the Romans were perishing of thirst in the heat of summer, when suddenly the cloudless sky darkened, and abundant showers fell, of which the soldiers were taking advantage when the barbarians attacked, and would have cut them to pieces, if a storm of hail and fire had not descended on the former. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and the emperor was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement, if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from it were nullified by a new outbreak in the east, occasioned through the infamous treachery of his own wife, which demanded his presence, and though suffering from failing health, he was obliged to leave Pannonia. Before his departure, however, he learned that the ambitious governor, Avidius Cassius, who had rebelled against him and seized the whole of Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the Fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with quite opposite feelings to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature, and even shrinking from the presence of the murderers. On his arrival in the east, he exhibited the same illustrious magnanimity. He burned the papers of Cassius, without reading them, so that he might not be at liberty to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mount Taurus; and her husband (and this was, perhaps, the single frailty of his character), though undoubtedly conscious of her glaring profligacy and infidelity, paid the most lavish honors to her memory.

On his way home, he visited Lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare

of his vast empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Towards the close of the year 176, he reached Italy, and celebrated his merciful and bloodless triumph, Dec. 23. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length sunk, and he died either at Vienna, or at Sirmium, after a reign of 20 years.

Marcus Aurelius A. was the flower of the stoical philosophy. It seems almost inexplicable that so hard and crabbed a system should have produced as pure and gentle an example of humanity as the records of heathen—we had almost said, Christian—history can show. Perhaps, as a modern philosophic theologian suggests, it was because stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly-increasing licentiousness of the time, that the chaste heart of the youth was drawn towards it. At 12 years of age, he avowed himself a follower of Zeno, Epictetus, etc. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes Atticus and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the state, he did not disdain to attend the school of Sextus of Chæronea. Men of letters were his intimate friends, and received the highest honors both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the springtime of his life, when enthusiasm was strong, and experience had not saddened his thoughts, and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained uncorrupted to the end of his noble life his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship,

and was believed to appear in dreams, like the saints of subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over—his hostility, namely, to Christianity. He was a persecutor of the new religion, and, it is clearly demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is, that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition, and a mysterious political conspiracy, was secretly spreading throughout the empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, comparatively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. John Stuart Mill finds in this tragical error of the great emperor a most striking warning against the danger of interfering with the liberty of thought.

ANTONINUS PIUS: *ăn-tō-nī'nus pī'us*, TITUS AURE'LIUS FULVUS, Roman emperor: 86-161: (reigned 138-161) b. in the reign of Domitian. The family of A. was originally from Nemausus, now Nimes, in Gaul. A. inherited great wealth, and early showed excellent qualities. In 120, he was made consul; afterwards was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won for him an excellent reputation In 138, he was adopted by the emperor Hadrian, in consequence of merit alone, and came to the throne in the same year. The reign of A. was proverbially peaceful and happy. He was little engaged in war, excepting in Britain, where he extended the power of Rome, and built a wall between the Forth and the Clyde, as a defense against invasions by the predatory inhabitants of the north; but he was frequently employed in arbitration and general counsel on the affairs of foreign states. By the justice, wisdom, kindliness, and courtesy of the emperor, his vast empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the recording of which formed the largest part of the historian's work in the dark centuries of the Roman empire. It is said that only *one* senator was impeached during A.'s lifetime. Literature received great encouragement; the laws were improved; commerce extended, the means of communication were facilitated by the repair of roads, bridges, etc.; new sanitary regulations were introduced, and a taste for architecture fostered in the citizens. The epithet PIUS was conferred on him on account of his conduct in defending the memory of his predecessor Hadrian against certain dishonoring measures brought for-

ward by the senate. The column raised to A.'s memory by his adopted son and successor, Marcus Aurelius Antoninus (q.v.), was discovered in 1709, and now exists only in fragments. The so-called Pillar of Antoninus, now in the *Piazza Colonna* at Rome, is that raised by the senate in honor of Marcus Aurelius, after his victory over the Marcomanni.

ANTONIUS, *ăn-tō'nĭ-ŭs*, MARCUS (MARK ANTONY), the Roman triumvir: B.C. 83–30; descendant of one of the oldest patrician families; son of the prætor M. Antonius Creticus, and on the side of his mother Julia, related to Julius Cæsar. His youth was wasted in dissipation, and finding himself pressed by numerous impatient creditors, he escaped to Greece in B.C. 58, where for a short time, he listened to the teaching of Athenian philosophers and orators. His studies here were soon interrupted by the proconsul Gabinius, who appointed him leader of his cavalry. In the campaign against Aristobulus in Palestine, and in Egypt, A. distinguished himself by his courage and activity, and ingratiated himself with the soldiers. After assisting Cæsar in Gaul, he went to Rome in 50, to advance the interests of the former, who stood in great danger from the hostility of the oligarchical party, and was appointed an augur, and chosen one of the tribunes of the people. In the following year, on account of his adherence to the party of Cæsar, he was expelled from the curia, and fled to Cæsar, who made use of this event as a pretext for his war against Pompey. At the outbreak of this war, A. received the appointment of commander-in-chief in Italy. In the battle of Pharsalia, he commanded the left wing of Cæsar's army. In 47, he was made master of the horse by Cæsar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself; was perpetually drunk; divorced his wife, and married an actress, with whom he paraded offensively through the chief towns of the peninsula. In 44, he married Fulvia, the widow of Clodius; was made consul, and vainly endeavored to prevail on the Romans to recognize Cæsar as emperor. After the assassination of Cæsar, he played the part so well described by Shakespeare: and by his funeral oration, and the well-timed display of Cæsar's bloody robe, so wrought on the passions of the people, that the conspirators were compelled to escape from Rome, leaving the successful orator for a while in possession of almost absolute power. A. was then occupied in disputes and reconciliations with Octavianus (Cæsar's heir), besieging Mutina, and then denounced by Cicero as an enemy of the state. In 43, his troops were defeated at the battle of Mutina, when he escaped beyond the Alps; visited the camp of Lepidus, who commanded in Gaul; and gained the favor of the army, of which he took the command. Plancus and Pollio joined him with their troops; and A., who so recently had escaped as a helpless fugitive from Italy, returned to Rome at the head of seventeen legions and 10 000 cavalry. Octavianus, who had pretended to maintain republican principles, now threw off the mask, and held a consultation with A. and Lepidus on the island of Reno

(or Lavino), near Bologna, when it was determined that these triumviri should share the whole Roman world among themselves. To secure their spoil, they returned to Rome, and began their course of murder and robbery throughout Italy. Among their first victims fell Cicero, the orator whose eloquence they dreaded. According to Appian, not less than 300 senators and 2,000 knights fell under the power of the triumviri. After making Italy safe for themselves, and raising an enormous sum of money to carry on their war abroad, A. and Octavianus led their troops into Macedonia against Brutus and Cassius, and defeated the republican forces. A. next visited Athens, and then went into Asia, to arrange his dispute with Cleopatra, queen of Egypt, whose conduct had offended the triumviri. The queen herself appeared to answer his challenge, and captivated A. by her beauty and address. The general who had overcome Brutus and Cassius was now made a prisoner, though not of war. He followed Cleopatra into Egypt, and lived with her in idleness and luxury, until he was aroused by tidings of the quarrel which had taken place in Italy between his own relatives and Octavianus. This dispute gave rise to a short war, which came to an end before A. arrived in Italy. A new division of the Roman world now took place between the triumviri, and was soon quietly arranged at Brundusium. A. took the east, and Octavianus took the west; while the ambition of the feeble Lepidus was appeased by his having the whole of Africa for his portion. Even this shadow of dominion was taken from him in 36. Meanwhile A. had confirmed his friendship with Octavianus by a marriage with Octavia, his sister. He now returned to Cleopatra, resumed his former voluptuous mode of life, squandered the wealth of Rome in gifts to his royal mistress, and became guilty of gross injustice. Octavianus made use of these facts to excite the indignation of the Roman people against A., and a war between the rivals became unavoidable. A., in his idleness, tried to postpone the trial of strength which he saw inevitably approaching, and filled the island of Samos (where his troops were quartered) with musicians, jugglers, and buffoons. Meanwhile, at Rome, he was deposed from the triumvirate, and war was proclaimed against Cleopatra. Each party collected its forces, and in the naval engagement which took place (31), near Actium (q.v.) A. was defeated. His subsequent hope of finding troops still faithful to him in Libya was disappointed. He returned to Egypt, where, with Cleopatra, he once more forgot political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavianus at Alexandria. A. now roused himself, made a charge with his cavalry, and repelled his enemy; but the advantage was only momentary. Deserted by the Egyptian fleet, as by his own army, and suspecting that even Cleopatra had conspired against him, he went to her palace, from which the queen had escaped. Deceived by a false message informing him of the death of Cleopatra, A. committed suicide by falling upon his sword.

ANTONIUS, or ANTONY OF PADUA, SAINT; 1195, Aug.

15—1231, June 13; b. Lisbon: on his father's side, related to Godfrey of Bouillon. He was first a monk of the Augustine order, but in 1220 he entered the Franciscan order, and soon became one of its most active propagators. On his missionary voyage to Africa, being cast on the coast of Italy, he preached with great success at Montpellier, Toulouse, Bologna, and Padua, where he died. The legends of A. abound in marvels, such as that his eloquence as preacher was so great, that even the fish in the sea were deeply affected by it! His anniversary is June 13. His monument, a fine work of statuary, is in the church which bears his name at Padua.

ANTONOMASIA, *ăn'tŏ-nŏ-mā'zĭ-ă:* a rhetorical figure in which an epithet is substituted for a proper name; e.g. 'the Stagyrite' for Aristotle. Or the process may be reversed; e.g. when a very rich man is called 'a Crœsus.' This figure has a resemblance to metonymy.

ANTON ULRICH, *ăn'ton ool'rik:* 1714–80 (supposed): second son of Duke Ferdinand Albert of Braunschweig-Wolfenbüttel (till 1735, Braunschweig-Bevern, the title by which the prince was first known in Russia. When the Russian empress Anna was looking out for an alliance for her niece, Anna Carlovna, princess of Mecklenburg-Schwerin, the influence of Austria led her to choose A. U. Accordingly, he came to Russia in 1733, was appointed colonel of a cuirassier regt., and placed in the receipt of a considerable pension. The marriage was, however, long delayed. The princess showed a decided distaste for the insignificant character of the bridegroom-elect, and married him only to avoid a still more hated union with the son of Biron. The birth of the prince Ivan took place in 1740, a year after the marriage. About the same time, the empress falling dangerously sick, appointed the infant prince her successor, and Biron regent. After her death, A. U. made some feeble attempts to reverse this appointment, which only led to the punishment of those supposed to have instigated them, and to his own military degradation. Biron's conduct towards the parents of the infant prince becoming unbearably insolent, Anna appealed in despair to Gen. Münnich, who put a sudden end to Biron's sway, and declared the grand duchess and her husband regents. After a few months, Anna ungratefully overthrew Münnich. After his fall, as little unity prevailed between the ministers at the helm as between herself and her husband, and the government was looked upon as both foreign and contemptible. Then came the revolution of 1741, Dec. 5, which in one night raised Elizabeth (q.v.) to the throne. A. U. and his consort were exiled, and lived long at Cholmogory, in the government of Archangel. Three children were born to them in exile. Anna died in 1746. Catharine II. offered A. U. his freedom, but he declined it. Ultimately, he grew blind. The exact year of his death is uncertain. Catharine offered his children an asylum in Jutland.

ANTONY, *ăn'to-nĭ*, Saint, surnamed The Great (also Antony of Thebes), the father of monachism.

abt. 251–356, Jan. 17; b. Koma, near Heraklea, Upper Egypt. His parents were wealthy and pious. Having, in obedience to what he believed to be a divine injunction, sold his possessions, and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Rom. Cath. Church, and formed the model of the monastic life. When 30 years of age, however, desirous of obtaining a deeper repose than his situation afforded, he penetrated further into the desert, and took up his abode in an old ruin on the top of a hill, where he spent 20 years in the most rigorous seclusion; but, in 305, he was persuaded to leave this retreat by the prayers of numerous anchorites, who wished to live under his direction. He then founded the monastery of Faïoum, at first only a group of separate and scattered cells near Memphis and Arsinoë; which may be considered the origin of cenobite life. The persecution of the Christians by Maximian in 311, induced St. A. to leave his cell and go to Alexandria, in the hope of obtaining the crown of martyrdom, but having failed in this, he returned to his solitude in the course of a year, which, however, he soon left, plunging yet deeper into the desert. At length he found a lodgment on a hill, about a day's journey from the Red Sea; but his disciples discovering his retreat, so pressed him with their affectionate importunities, that he ventured to accompany them back. After many pious exhortations, he once more left them, and soon became the mighty oracle of the whole valley of the Nile. In 355, the venerable hermit, then 104 years of age, made a journey to Alexandria to dispute with the Arians. He had interviews with Athanasius and other distinguished persons; but feeling his end approaching, he retired to his desert home, where he died.

Athanasius states, in his *Life of St. A.*, that the saint wore only a coarse shirt of hair, and never washed his body, which is more credible than the stories that he relates of his encounters with the devil, or his miracles. His whole conduct indicates the predominance of a glowing and yet gloomy fancy—the proper condition of religious asceticism. Although the father of monachism, St. A. is not the author of any monastic 'rules'; those which the monks of the eastern schismatic sects attribute to him are the production of St. Basil. He is perhaps the most popular saint in the Rom. Cath. Church. Accounts of his life and miracles are given in the *Acta Sanctorum* of the Bollandists, under date Jan. 17, on which day his festival was kept.

St. Anthony's Fire.—The Rev. Alban Butler, in his *Lives of the Saints*, gives the following account of the origin of this name: 'In 1089, a pestilential erysipelatous distemper, called the *sacred fire*, swept off great numbers in most provinces of France; public prayers and processions were ordered against this scourge. At length, it pleased God to grant many miraculous cures of this dreadful distemper, to those who implored His mercy through the intercession of St. A., especially before his relics: the church [of La Motte St. Didier, near Vienne in Dauphiné] in which they were deposited was resorted to by great numbers of pilgrims,

and his patronage was implored over the whole kingdom against this disease.' The 'Order of Canons Regular of St. Anthony,' a religious fraternity, founded about 1090, for the relief of persons afflicted with the fire of St. A., survived in France till 1790.

St. Anthony's Well, a small fountain near the ruined chapel of St. A., on the n. slope of Arthur's Seat (q.v.), near Edinburgh. This interesting fountain, which consists only of a stone basin, into which water trickles from under an incumbent rock, is celebrated in the Scottish song, *'O, waly, waly.'*

ANTRAIGUES, *ŏn-trāg'*, Emanuel-Louis-Henri Delaunay, Comte d': 1755-1812; b. Vivarais, dept. Ardèche; a great politician, but very ambiguous character. He was educated under the Abbé Maury. His superior talents were shown first in his *Mémoire sur les Etats-généraux, leurs Droits et la Manière de les convoquer* (1788). This book, full of daring assertions of liberty, was one of the first sparks of the fire which afterwards flamed in the French Revolution. In 1789, when A. was chosen as a deputy, he not only defended the privileges of the hereditary aristocracy, but also ranked himself with those who opposed the union of the three estates; while in the discussions on the constitution, he maintained that the royal *veto* was an indispensable part of good government. After leaving the assembly in 1790, he was employed in diplomacy at St. Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803, he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure entitled *A Fragment of the 18th Book of Polybius, discovered on Mount Athos.* He afterwards went to England, and acquired great influence with Canning. Despite his attachment to the interest of the Bourbons, he could never win the confidence of Louis XVIII. In 1812, he was murdered, with his wife, at his residence near London, by an Italian servant, who, immediately afterwards, committed suicide.

ANTRE, n. *ăn'tẽr* [L. *antrum*, a cave]: in *poetry*, a cavern; a den.

ANTRIM, *ăn'trĭm:* maritime county in the n.e. of Ireland, province of Ulster; bounded, n. by the Atlantic; w. by the n. part of the river Bann, dividing it from Londonderry, and by Lough Neagh; s. by Lagan river, separating it from the county of Down; s.e. by Belfast Lough; and e. by the Irish Channel. It stands third among the Irish counties in population, but in extent only ninth; area 1,237 sq. miles. About two-thirds of this is arable; a fourth barren; and a seventy-fourth in woods. Off the n. coast lie Rathlin Isle and the Skerries; and off the e. coast, the Maiden Rocks; the e. coast is hilly; and from Larne to Fair Head, parallel mountain-ranges of no great height, and covering a third of the county, stretch s.w. into the interior, forming valleys opening seaward, called the Glens of Antrim. The interior slopes towards Lough Neagh. The principal streams are—the Bann, from Lough Neagh

to the Atlantic; the Main, running parallel to the Bann, but in the reverse direction, into Lough Neagh; and the Bush, flowing n. into the Atlantic. Peatbogs are numerous. Six-sevenths of the surface consists of basaltic trap, often alternating with red ochre, and overlying hardened chalk, green-sand, new red sandstone, and mica-slate. The surface and edges of the trap-field, in some places, present basaltic columns of varied outlines. The green-sand and new red sandstone crop out on the e. and s.e. borders, and millstone grit occurs in the n.e. Between Ballycastle and the mouth of the Bann, the basalt assumes very picturesque forms; and the Giants' Causeway is one of the most perfect examples of columnar basalt in the world. Fine salt mines occur at Duncrue and Carrickfergus; and small coal-fields near Ballycastle, and in the interior. Rich beds of iron ore of fine quality have been recently opened in Glenravel, and a large export has been carried on from Cushendall and Carnlough. The land is very much subdivided; and the rearing of flax, and the various branches of the linen, cotton, and coarse woolen manufacture, employ a great portion of the people. The principal towns are Belfast, Lisburn, Ballymena, Ballymoney, Carrickfergus, Larne, and Antrim. Nearly one-half of the inhabitants are Presbyterians, the county having been extensively colonized from England and Scotland. The original possessors were the O'Neills, who, partially dispossessed by John de Courcy, reappeared on the failure of his line, regained nearly the whole of the country, and kept it till the forfeiture of Shane O'Neill. Pop. (1851) 352,264; (1861) 368,948; (1871) 404,015; (1881) 421,943; (1901) 461,250.

ANTRORSE, a. *ăn-trŏrs'* [L. *ante,* before; *versus,* turned]: in *bot.,* having an upward direction towards the summit of some part.

ANT'WERP (Dutch, *Antwerpen;* French, *Anvers;* Spanish, *Amberes;* Old German, *Antorff;* from 'aent werf,' 'on the wharf'): a province of Belgium, south of Holland, consisting for the most part of an extensive plain of 1,096 sq. miles. The chief towns are Antwerp, Mechlin (Malines) Turnhout, Lierre, and Boom. Pop. (1901) 819,000.

ANTWERP, *ănt'wėrp* (in French, ANVERS, *ŏn-vair'*): cap. of the prov. which bears its name, and the chief commercial city of Belgium; on the river Scheldt. Its chief public institutions are the Acad. of Sciences, Acad. of Painting and Sculpture, formerly known as the Acad. of St. Mark, a Medical and Surgical School, Naval Arsenal, Museum, and Zoological Gardens. The cathedral, one of the noblest Gothic structures in Europe, is 500 ft. in length by 240 in breadth, with a roof supported by 125 pillars, and a very lofty spire. The interior is enriched by the two greatest of all the pictures of Rubens, *The Elevation of the Cross,* and *The Descent from the Cross.* The Church of St. James contains the monument of the Rubens family. The

new fortifications, recently erected, render this commercial capital of Belgium one of the most strongly fortified places in Europe. The trade and manufactures of A. have recently greatly extended, and the large dock and quay accommodation having been found too limited, steps have been taken for making a new quarter of the town, with ample harbor-room, on the opposite side of the Scheldt. The manufactures consist chiefly of sugar, white-lead, cotton goods, point-lace, linen thread, carpets, gold and silver lace. It is celebrated for its sewing-silk, black silk stuffs, and printer's ink, as it was in former times for its velvets, damasks, and satins. There are also to be mentioned tobacco manufacture, the cutting of diamonds and other precious stones, and shipbuilding.

A. is mentioned as early as the 8th c.; in the 12th and 13th it gave signs of considerable prosperity, and in 1550 numbered more than 200,000 inhabitants. The union of Belgium with Holland in 1815 was very favorable to the commerce and general prosperity of A. By the revolution, 1830, Aug., it was linked to the destiny of Belgium. When the revolutionary party gained possession, the commandant, Gen. Chassé, retreated to the citadel, and, exasperated by the breach of truce, commenced a bombardment, which destroyed the arsenal and about thirty houses. In 1832, a French army of 50,000 men, under Marshal Gérard, appeared before A., to demand the surrender of the citadel, which Gen. Chassé refused. After the interior of the citadel had been reduced to ruins by the French artillery, Gen. Chassé capitulated; the Flemish fortification, and the forts Burght, Zwindrecht, and Austroweel were surrendered to the Belgian troops, and the Dutch troops were taken to France, as hostages for the surrender of the forts Lillo and Liefkenshoek, according to an article in the negotiation of 1831, Nov. 15, which stipulated that the five citadels held by the Dutch troops in Belgium should be surrendered. Pop. (1901) 278,093.

ANUBIS, n. *ă-nū'bĭs:* an Egyptian deity, styled Anepu on hieroglyphic monuments; according to mythology, the son of Osiris and Nephthys. By the Greeks, he was frequently styled Hermes or Hermanubis, combining the Egyptian with the Grecian name. He is represented on monuments as having the head of a jackal, with pointed ears and snout, which the Greeks frequently changed to those of a dog. Sometimes he is seen wearing a double crown. A white and yellow cock was sacrificed to him. His office, like that of Hermes Psychopompus among the Greeks, was to accompany the ghosts of the deceased into Hades (Amenthes), and there to assist Horus in weighing their actions, under the inspection of Osiris. As, in the time of the Romans, the Egyptian worship had spread beyond Egypt itself, the two conceptions of A. and Hermes were blent together, and the dog's head of the former was found united to the insignia of the latter.

Anubis.

THE CATHEDRAL OF ANTWERP.

Completed in 1518.

A BEAUTIFUL EXAMPLE OF GOTHIC ARCHITECTURE.

ANUPSHUHUR, *an-ŭp-shuh-hėr′:* town of India, in the British dist. of Bolundshuhur, Northwest Provinces, on the right bank of the Ganges, 73 m. e. from Delhi, on the route to Bareilly. The channel of the Ganges is here about a mile wide, but only about one-fifth of that space is occupied by the stream in the dry season. The town is ill built and crowded, the houses either of mud or ill-cemented brick. Pop. about 12,000.

ANUS, n. *ā′nŭs* [L.]: a term applied by anatomists to the lower or (in the case of animals) the posterior aperture of the intestinal canal; the rectum terminating externally in the anus. With regard to its anatomy, it is sufficient to state that it is kept firmly closed on ordinary occasions by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening, and, by its attachment to the coccyx behind, and to a tendinous centre in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the fæces or intestinal evacuations; the *internal sphincter* is an aggregation of the circular muscular fibres of the lowest part of the rectum, and acts in contracting the extremity of the tube. The integument around the anus lies in radiating plaits, which allow of its stretching without pain during the passage of the fæces.

Infants are occasionally born with an *imperforate anus,* or congenital closure of the rectum. In the simplest form of this affection, the anus is merely closed by thin skin. More complicated cases are those (1) in which the gut terminates some distance above the seat of the anus in a blind sac or pouch; (2) where the rectum terminates in the bladder, etc. Fortunately, the closure by a layer of skin is far the most common form of imperforate anus, and the little patient is at once relieved by a very simple surgical operation. If, however, no treatment be adopted, the abdomen becomes distended and hard, vomiting comes on, the vomited matters soon assume a fæcal smell, and the infant dies in a few days, either from exhaustion or rupture of the intestines.

Spasm of the Sphincter Ani is by no means a rare affection; it is characterized by violent pain of the anus, with difficulty in passing the fæces. On attempting an examination, the muscle feels hard, and resists the introduction of the finger. It usually occurs in sudden paroxysms, which soon go off: but sometimes it is of a more persistent character. Suppositories containing opium or belladonna, introduced during the period of relaxation, are sometimes of use; and if there are ulcers, they must be specially treated. *Ulceration* at one or more points around the anus, but not extending within the orifice, is by no means uncommon. Strict attention to cleanliness, the patient being directed to apply warm water to the parts at least twice daily with a sponge (which after each operation should be carefully rinsed out), and one or two applications of the solid nitrate of silver, followed by

black-wash, will probably effect a cure. If the ulcer be seated partly *without* the anus and partly *within* the rectum, the distress is much more severe, and the treatment often requires the use of the knife. *Fissure of the anus* is a term applied to an affection consisting in one or more cracks, excoriations, or superficial ulcerations, situated between the folds of the skin and mucous membrane at the verge of the anus, and only slightly involving the rectum. They give rise to intense pain during the passage of the evacuations, and for some hours afterwards to great discomfort, smarting, and itching. The treatment to be adopted is to endeavor to procure regular and somewhat soft evacuations, and to sponge with warm water immediately afterwards, the parts being dried with a soft cloth. One or two applications of solid nitrate of silver will sometimes cure the disease; and an ointment of oxide of zinc, or one containing chloroform, will sometimes serve to allay the irritation and heal the parts.—*Pruritus ani,* which simply means intense itching and irritation of this part, is common, and productive of much suffering. It is often associated with an unhealthy state of the intestinal secretions, or with simple constipation; with a congested state of the mucous membrane; with a disordered condition of the womb; with the presence of thread worms in the rectum, etc.; and it is peculiarly common in persons whose occupations are sedentary. If the affection arise from worms, or a loaded state of the large intestines, enemata and purgatives will give relief. If unhealthy excretions exist, attention must be paid to the diet, and the occasional administration of a pill containing some alterative and aperient as may be advised until relieved, together with the local application of soap and water to the parts, will often stop the itching. If there are any cracks or ulcers, nitrate of silver must be applied until they heal. To prevent the reappearance of these sores, the patient should bathe the parts night and morning with a strong solution of alum. For other principal affections of the anus, see FISTULA: PILES: PROLAPSUS.

ANVIL, n. *ăn′vĭl* [AS. *anfilt;* Low Ger. *ambolt;* Dut. *aenbeld,* a block to hammer on]: an iron block with a smooth face and a horn, on which smiths shape their work. ON THE ANVIL, in a state of formation and preparation; not yet matured.

ANVILLE, *ŏn′vēl,* JEAN BAPTISTE BOURGUIGNON D': 1697-1782; b. Paris: celebrated French geographer. His first study of the ancient authors induced him to publish, at the age of 15, a map of Greece. His rare qualities gained the friendship of the Abbé de Songuerue, whose instructions were the source of his profound and extensive knowledge. He advanced the science of geography, both by his very numerous maps, and by his elaborate treatises. The principal portion of A.'s works, edited by M. de Maine, was published in 1834 by Levrault. But the death of M. de Maine, in 1832, stopped the quarto edition near the end of the twelfth volume. A. left 211 maps and

plans, and 78 memoirs, the most of which are inserted in the *Recueil des Mémoires de l'Académie des Inscriptions et Belles-lettres*. His best map is that of Ancient Egypt. His *Orbis Veteribus Notus*, and *Orbis Romanus*, are of great value, as also his maps of Gaul, Italy, and Greece, both ancient and mediæval. His collection of maps was purchased in 1779 by the French government for the Royal Library.

ANWARI, *ân′wâ-rē*, lived 12th c.; d. 1200-01; b. in the prov. of Khorassan: celebrated Persian poet; educated at the college of Mansur, at Tus. He emerged from obscurity in the course of a night. The story goes that the Seljukide sultan, Sanjar, happened on one occasion to visit Tus, when the imagination of the youthful poet was so excited by the presence of the monarch and his glittering retinue, that he resolved to write a poem in his praise. By next morning it was finished, and presented to Sanjar, who instantly placed the fortunate youth among his courtiers. A. turned his attention to astrology, which was his ruin; for having predicted that in 1185 or 1186 a hurricane would burst over all Asia, overthrow the most solid edifices, and shake the very mountains, and nothing of the sort really occurring, but, on the contrary, an entire year of remarkably tranquil weather, he fell into disgrace, and retired to Balkh, where he died. His poems consist chiefly of long panegyrics, and shorter lyrical effusions. The latter (*ghazels*) are characterized by simplicity, ease, and naturalness; but the *kasidas*, or long poems, are disfigured, like many other eastern poems, by glittering imagery and historical conceits. His *Elegy on the Captivity of Sanjar taken Prisoner by the Ghurides*, has been translated into English by Captain Kirkpatrick in the 1st vol. of *Asiatic Miscellanies* (Calcutta, 1785).

ANXIETY, n. *ăng-zī′ĕ-tĭ* [F. *anxiété*, anxiety—from L. *an′xĭĕtātem*, anxiety—from L. *anxĭŭs*, anxious; *ango*, I press tight (see ANGUISH)]: distress of mind about something future; great uneasiness. ANXIOUS, a. *ănk′shŭs*, literally, that chokes or strangles; distressed in mind; perplexed. ANX′IOUSLY, ad. *-lĭ*. ANX′IOUNESS, n. the state of being anxious.—SYN. of 'anxious': restless; disturbed; uneasy; unquiet; concerned; watchful;—of 'anxiety': care; solicitude; concern; uneasiness; foreboding; disquiet; disquietude; perplexity.

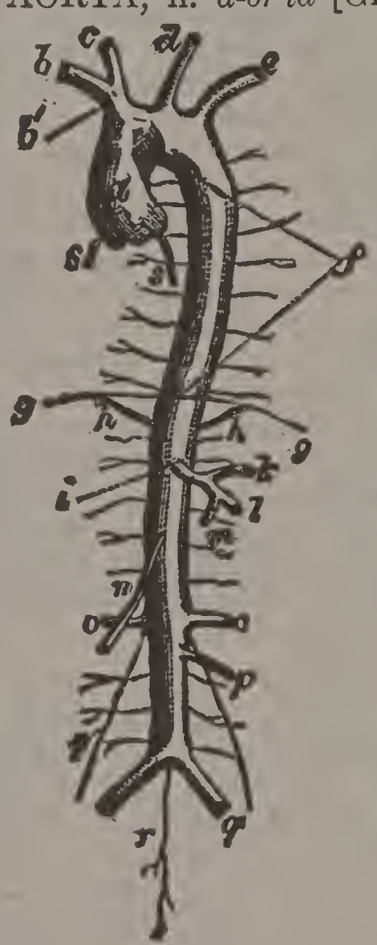
ANY, *ĕn′nĭ* [AS. *aenig;* Ger. *einig;* Dut. *eenig*, one, only, and postfix *ig*]: every; whoever; one or some; one of many; in *Bible*, at all. ANYWISE, ad. *ĕn′nĭ-wīz*, in any degree. AN′YWHERE, ad. *-whār*, in any place. ANYHOW, ad. *ĕn′nĭ-how*, at any rate, in any event; in a careless, slovenly manner. ANYBODY, n. *ĕn′nĭ-bŏd′ĭ*, one selected indifferently out of many. ANYTHING, n. indifference by way of selection; not one thing more particularly than another; a particular object. ANY ONE, n. no one in particular; 'one,' when preceded by a negative. ANYWHILE, ad. for any length of time.

AONIAN, a. *ā-ō′nĭ-ăn* [from *Aōnĭă*, a dist. in Greece, in which were Mt. Helicon and the fountain Aganippe; a haunt of the Muses]: pertaining to the Muses. AONIDES, n. *ă-ŏn′ĭ-dēz*, a name for the Muses.

AONLAGANJ′, or AOUN′LAH: town of India, in the British dist. Bareilly, 21 m. s.w. of Bareilly, on the route to Allygurh. It has a large bazaar. Pop. (1871) 9,947.

AORIST, n. *ā′ŏ-rĭst* [Gr. *āŏris′tos*, unlimited]: a tense in the grammar of the Greek language; a form of the Greek word by which an action is expressed as taking place in an indefinite time. A. is peculiarly adapted to the narrative style of writing. The distinction of first and second A. is merely formal. AORISTIC, a. *ā′ŏ-rĭs′tĭk*, pert. to.

AORTA, n. *ā-ŏr′tă* [Gr. *ā′ŏrtē*, the great artery—from *aer′rō*, I bear or carry]: the great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. AORTAL, a. *ā-ŏr′tăl*, or AORTIC, a. *ā-ŏr′tĭk*, pert to. The A. in man is subdivided by anatomists into the Arch, the Thoracic A., and the Abdominal A. The *arch* is a loop with the convexity directed upwards, forwards, and to the right side, reaching at its highest part to a level with the second piece of the breast-bone, and then descending to the left side of the third dorsal vertebra. Five arteries arise from the arch—viz., two coronaries, for the supply of the muscular tissue of the heart itself, the innominate, the left carotid, and left subclavian arteries. At the commencement of the arch are three small swellings or pouches, the aortic sinuses, below which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood back into the heart. The *thoracic* A. extends from the third dorsal vertebra to the diaphragm, gradually getting into the middle line of the spine. The thoracic A. gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the œsophagus, and intercostal arteries, to sup-



Aorta:

a, ascending arch of aorta; *ss*, coronary arteries; *b′*, innominata artery; *b*, right subclavian; *c*, right carotid; *d*, left carotid; *e*, left subclavian; *f*, thoracic aorta; *gg*, diaphragm; *hh*, phrenic arteries; *i*, coeliac axis; *k*, coronary or gastric; *l*, splenic; *m*, hepatic; *n*, superior mesenteric; *oo*, renal arteries; *p*, inferior mesenteric; *p′*, spermatic; *q*, common iliac; *r*, middle sacral.

ply the walls of the chest (ten on left, and nine on right side). The *abdominal A.* passes from the diaphragm to the fourth lumbar vertebra, opposite the lower margin of which it divides into the two common iliac trunks. The abdominal A. gives off the two phrenic arteries to the diaphragm; the cœliac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric for the small, and part of the large intestine; the renals (two); the supra renals (two), one for each kidney; the spermatic; the inferior mesenteric, for the part of the large intestine not supplied by the superior mesenteric; and four or five lumbar arteries, which supply the lower part of the abdominal walls (the loins).

Where the A. bifurcates, a small artery, the middle sacral, or caudal artery, arises, and passes along in the middle line; in fish and in animals with large tails, this branch is a continuation of the A.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. For the structure of the A. see ARTERY; for the comparative anatomy, see HEART: CIRCULATION.

AOSTA, *â-ōs'tâ:* dist. of the prov. of Turin, n. Italy, surrounded by the highest elevations of the Alps, and watered by the river Dora baltea; area, over 1,200 sq. miles. The dense pine-woods on the hills, the alpine pastures on the slopes, the plantations of vines, almonds, olives, figs, and mulberry trees in the valleys, and the ores of silver, copper, and iron in the bosom of the mountains, supply occupation and means of subsistence; but the land generally is not adapted to the growth of grain, though maize, barley, oats, etc., are produced in the lowest portions of the valleys. There are also numerous mineral springs in the district. Great numbers of the poorer class emigrate during winter into the richer countries in their vicinity, and earn a livelihood as chimney-sweepers, masons, and smiths. Pop. abt. 83,000.

AOSTA, the principal town, 49 m. n.n.w. of Turin, has trade in cheese, hemp, leather, etc. It was in ancient times the chief residence of the Salassi, a brave race of mountaineers, with whom Appius Claudius had to contend on his way into Gaul. They were finally destroyed by Terentius Varro in the time of Augustus. Monuments of the Roman times remain—a well-preserved arch, two gateways, the ruins of an amphitheatre, and a bridge. The celebrated baths and mines of St. Didier are in the neighborhood. St. Bernard, the founder of the famous hospice which bears his name, was Archdeacon of A.; and Anselm, Abp. of Canterbury, was born here. Pop. (1901) 7,875.

AOUDAD, n. *â'ô-dăd* [native name]: a goat-like species of wild sheep inhabiting n. Africa.

APACE, ad. *ă-pās'* [AS. *a*, on: F. *pas;* L. *passus*, a step]: with some degree of speed; in haste; quickly; by-and-by.

APACHES, *â-pâ'chāz:* tribe of American Indians of the

Athabasca family, in Tex., Ariz., and N. M.; about 5,200. They are very warlike, great raiders, and strongly averse to civilized forms of life. The tribe comprises several semi-independent bands, and their great war chief is Geronimo. They gave the frontier settlers of Mexico, Ariz., and N. M., and the federal govt. much trouble for many years. Geronimo became known 1876, and was captured several times by U. S. troops, but almost invariably succeeded in escaping. He was considered by experienced army officers to be the most tricky, lawless, deceitful, treacherous, and murderous of living Indians. Gen. Crook chased his renegade band into Mexico 1883, and captured the chief and his followers. They were placed on a farm, and though Gen. Crook promised them protection as long as they behaved themselves, they soon tired of the restraint Geronimo escaped from Fort Apache 1885, May 17—his third escape—was captured by Gen. Miles 1886, and was afterward confined in Fla. and Okl.

APAFI, *ŏp′pŏf-ē*, Michael I., Prince of Transylvania: 1632-1690, Apr. 15. He belonged to an old family; accompanied Prince George II. in an expedition against the Poles 1656; was taken prisoner; and after his release lived at his paternal estate till 1661, when he was chosen prince of Transylvania. He reigned under the protection of Turkey till the siege of Vienna 1683, when the Austrian troops entered his territory, and 1687, Aug. 12, he made a treaty with the emperor by which Transylvania was placed under German protection. His death occurred on the eve of a fierce war begun by the Turks. His son, Michael II., succeeded to the throne. The Turks defeated the imperial army, and captured several cities; but the imperial troops regained everything, and A. was induced to surrender his territory to Austria for a pension. Michael II. died 1713.

APAGOGE, n. *ăp′ă-gō′jē* [Gr. *apagōge*, a leading away—from *apo*, from; *ago*, I lead]: in *logic*, a kind of argument or proposition not very evident; in *math.*, the step leading from one proposition to another, when the first, after demonstration, is employed in proving the second or others. Apagogical, a. *ăp′ă-gŏj′ĭ-kăl*, proving indirectly.

APALACHICOLA, *â′pa-lăch-ĭ-kō-la*, Fla., city, port of entry and county-seat of Franklin county, on Saint George Sound, Gulf of Mexico, at the mouth of the Apalachicola River; 85 miles southwest of Tallahassee; on the Carrabelle, Tallahassee & Georgia railroad, and the following lines of steamships: Plant; People's; Merchants and Planters'; Gulf Navigation Co.; Central Gulf Coast Co.; and the Apalachicola and Chipola River line. The city has an important trade in timber and naval stores. The value of its foreign commerce in 1901 amounted to $370,000, the most of which was in export trade. The city has one national and several private banks. Pop. 3,200.

APALACHICOLA: a river flowing from southeastern Georgia across Florida, and entering the Gulf of Mexico

through Apalachicola Bay. It is navigable throughout its length of 90 miles and is formed by the union of the Flint and Chattahoochee rivers.

APAR, *â'pâr:* the three-banded armadillo (*Tolypeutes tricinctus*), which has three movable bands and is one of the small species able to roll itself into a ball. See ARMADILLO.

APART, ad. *ă-pärt'* [F. *a* part, aside, separate; L. *partem*, a part]: aside; separately; at a distance. APART'MENT, n. [OF. *apartement;* F. *appartement*—from mid. L. *appartĭmen'tum*]: something set aside; a room in a house.

APARTMENT-HOUSE: a building designed to accommodate several families. The increased valuation of ground in large cities, as well as the economy in living, has led to the erection of such buildings. The apartment house is fitted with all modern improvements for the comfort and convenience of its occupants.

APATHY, n. *ăp'ă-thĭ* [F. *apathie*, apathy: L. *apăthīa;* Gr. *apatheï'a*, exemption from passion—from Gr. *a*, without; *păthos*, any emotion of the mind]: not any feeling; freedom from passion or feeling. AP'ATHIST, n. one destitute of feeling. APATHETIC, a. *ăp'ă thĕt'ĭk*, or AP'ATHET'ICAL, a. *-ĭ-kăl*, wanting in feeling; insensible. AP'ATHET'ICALLY, ad. *-lĭ.*—SYN. of 'apathy': indifference; insensibility; unfeelingness; supineness; carelessness; unconcern.

APATITE, n. *ăp'ă-tīt* [Gr. *apătē*, deception, from liability of this mineral to be mistaken for other substances]: a mineral consisting mainly of phosphate of lime (bone-earth), combined with fluorine or chlorine. The crystals have a specific gravity of about 3.2 and a hardness of 5. Apatite is usually green, but it may occur white, or strongly red, yellow, brown, or blue. The common variety has the formula (CaF) $Ca_4(PO_4)_3$, and is known as 'fluor-apatite'; but the fluorine is sometimes replaced to a considerable extent, or even wholly, by chlorine. In such cases the mineral is known as 'chlor-apatite.' A variety called 'mangan-apatite' is also known, in which the calcium of the typical mineral is partially replaced by manganese. It was formerly extensively mined as a fertilizer, but its use has now been almost entirely supplanted by the 'rock phosphate' of Florida, South Carolina, and Tennessee. See FERTILIZERS. A. is found as a bedded rock, in compact spheroidal masses, in veins and dykes, and as an accessory constituent of rocks. It exists in nearly all geological formations, but is perhaps most abundant in the older metamorphic rocks. Extensive deposits of A. occur in various parts of the world. From Krageröe in Norway, where it occurs associated with granite rocks, and from Estremadura in Spain, where it is found in cretaceous strata, it has been largely sent to England. There is a bed of A., 18 inches thick, of Silurian age, at Llanfyllin in North Wales, which has been extensively worked. A remarkable deposit of a kind of A., or rather rock guano, which has been termed 'Sombrerite.' was discovered some years ago in the

West Indian group. It covers a great part of the island, which is about 1½ m. long by three-fourths of a m. in breadth. A similar hard guano occurs at Monk's Island, and one or two others in the Carribbean Sea. A. occurs both massive and in crystals—which are generally small, and are often six-sided prisms, or six-sided tables, but some very large ones have been brought from Canada. It occurs in some of the tin mines in Cornwall, Saxony, Bohemia, etc., and in rocks of various ages, as mentioned above. It is of various colors, more or less green, blue or red, sometimes white and often gray. In Spain, A. is used as a building stone.

APE, n. *āp* [AS. *apa:* Icel. *api.* Dan. *abe*]: a kind of monkey; a vain imitator; a mimic: V. foolishly to try to imitate. Ap'ing, imp. Aped, pp. *āpt.* Ap'er, n. one who. Apish, a. *āp'ĭsh,* like an ape; foolish; imitating the manners of superiors. Ap'ishly, ad. *-lĭ.* Ap'ishness, n. foppery.—Syn. of 'ape, v.': to mimic; imitate; mock.

APE: name commonly given to the tailless monkeys. It was originally commensurate in signification with monkey, and the terms were indiscriminately used. The origin of the word is uncertain. In its modern sense it applies particularily to the family *Simiidæ,* or anthropoid apes, found in the forests of the equatorial regions of the Old World and called 'anthropoid.' The gibbons (noticeable for standing erect with less difficulty than any other apes), the chimpanzee (which has the largest brain), the gorilla, and the orang-utan, together with several extinct and fossil species, make up the anthropoid apes. All are clothed with hair on all parts of the body except the face and palms; they have no cheek-pouches, no tail, and either no trace or but very slight traces of the naked spots or callosities seen upon the buttocks of the lower apes. All are as large or larger than man, and all can walk upright, though they are more at ease in climbing than in walking. When on the ground they make their way slowly, sometimes closing the hands in order to walk on the knuckles instead of the palm, and either similarly closing the foot or walking on its side. Their food is mainly vegetable, yet their great strength, their intelligence, and their savage nature, place them among the the most dangerous of wild animals. See Chimpanzee; Gibbon; Gorilla; Orang-Utan.

APEAK, or Apeek, ad. *ă-pēk'* [*a* and *peak:* F. *à pic,* perpendicularly—from *pic,* a peak, a point]: on the peak or point; in a posture to pierce; a maritime term signifying the position of an anchor when the cable has been drawn so tight as to bring the ship directly over it; the sailors then say that 'the anchor is apeak.'

APELDORN, *â'pĕl-dōrn':* a beautiful village in the Netherlands, province of Gelderland, about 17 m. n. from Arnhem, on a canal which joins the river Grift, a branch of the Yssel, by which, and the public roads from Arnhem and Utrecht to Deventer and Zutphen, and by railway, it has

much traffic. The Loo, a hunting-lodge of the king, is in the neighborhood. The principal industries are agriculture, making paper, grinding corn, founding copper, manufacturing blankets and coarse woolen cloth, etc. Pop. of A. (1901) 27,586.

APELLES, *a-pĕl'ēz:* the most celebrated painter in ancient times: lived in latter part of B.C. 4th c., prob. abt. B.C. 352-308; son of Pythieas, b. probably (according to Suidas), at Colophon, on the Ionian coast of Asia Minor; though Pliny and Ovid call him a Coan, and Strabo, and Lucian an Ephesian. This, however, may simply refer to the fact that he was made a burgess of that town. He received his first instruction in art in the Ionian school of Ephesus, then studied under Pamphilus of Amphipolis, and latterly at Sicyon, under Melanthius; and thus he united the fine coloring of the Ionian with the accurate drawing of the Sicyonic school. During the time of Philip, A. visited Macedon, where he became the intimate friend of Alexander the Great. It was probably at the Macedonian court that the best days of A. were spent. But the same story is told of Zeuxis and Megabyzus. He afterwards visited Rhodes (where he was familiar with Protogenes), Cos, Alexandria, and Ephesus. The period of his death is not known; but as he practiced his art before the death of Philip, and as his visit to Alexandria was after the assumption of the regal title by Ptolemy, he lived, probably, between the dates above stated. The most celebrated paintings of A. were his *Anadyomene*, or *Venus Rising from the Sea*, with a shower of silver drops falling round her like a veil of gauze; the Graces, and similar subjects; but he cultivated the heroic as well as the graceful style. His ideal portrait of Alexander wielding a thunderbolt was highly esteemed, and preserved in the temple of Diana at Ephesus. A. is said to have left an incomplete painting of Venus, to which no other painter would presume to give the finishing touches. The disposition of A. was remarkably free from envy, and he willingly acknowledged the merits of his contemporaries. Amphion, he said, excelled him in grouping, and Asclepiodorus in perspective, but *grace* was his alone. On coming to Rhodes, and finding that the works of Protogenes were not appreciated by his countrymen, he at once offered him fifty talents for a picture, and spread the report that he intended to sell it again as his own. The industry with which he practiced drawing was so great as to give rise to the proverb, *Nulla dies sine lineâ*. Many other anecdotes are related of A. When his pictures were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is said that A. instantly rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place, and told the cobbler to stick to the shoes; or, in the Latin version, which has become proverbial, *Ne sutor supra crepidam.*

APENNINES, n. *ăp'ĕ-nīnz* [Ital. *Appeni'ni;* anciently, Lat. *Mons Apenninus*]: a mountain-chain extending uninterruptedly through the whole length of the Italian peninsula, between 37° and 44° 30′ n. lat., and 7° 40′ and 18° 20′ e. long.; belonging to the system of the Alps, from which it branches off at the Col de Tenda, near the sources of the Tanaro. From this point, the chain, under the name of the Ligurian A., girdles the Gulf of Genoa, in the immediate vicinity of the sea, and then runs inland to a considerable extent, forming the water-shed between the Adriatic and the Mediterranean, but gradually approaching the e. coast till in the highlands of the Abruzzi, it is close upon it; after which it takes a s.w. direction through Naples, dips under the sea at the Strait of Messina, and reappears on the n. coast of Sicily. Recent geographers divide the A. as follows: 1. *The North A.*, from the Col de Tenda in the Maritime Alps to the pass of Borgo San Sepolcro, in the neighborhood of Arezzo, on the e. border of Tuscany. 2. *The Central A.*, from Arezzo to the valley of the Pescara, which flows between the two Abruzzi. 3. *The South A.*, from the valley of the Pescara to Cape Spartivento. 4. *The Insular A.*, or the Sicilian range. The leading feature of the A., wherever they approach the coast, is their extraordinary steep declivities; while in Middle Italy and the adjoining portions of Upper and Lower Italy, long-terraced plateaus, lower ranges, and, finally, extensive coast-plains, mark their gradual descent on the w. The general name for these lower ranges is *Sub-Apennine;* but they have a variety of particular designations, such as, the mountains of Carrara and Seravezza, Pratomagno and Monte Amiata, in Tuscany; the Sabine, Alban, and Volscian mountains, in the former papal states; Monte Gargano on the s.e. coast, n. of Manfredonia, etc. The main chain of the A. does not send off spurs into the Apulian peninsula, or heel of Italy, which, for the most part, is rather level, or only interspersed with detached groups of hills.

The direction of the great chain of the A. is favorable to the formation, on the w. side, of important river-basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while on the e. side we find nothing but small streams, in most cases destitute of affluents, hurrying down to the sea through wild, precipitous valleys. In n. Italy, the Ligurian A., almost overhanging the Gulf of Genoa, can only develop on the s. puny streams, while the n. sends down, through the plains of Piedmont, large tributaries to the Po.

The average height of the entire chain of the A. is about 4,000, ft. which, however, in the n. sinks down to little more than 3,500 ft.; and in the mountains of the Abruzzi rises to 7,000 ft. Here, in Monte Corno, the highest peak of the range known under the name of Gran Sasso d'Italia, they reach an elevation of 9,585 ft., and in Monte Velino, of 8,150 feet. The North A. attain, in Monte Cimone, situated in the s. of Modena, a height of 7,103 ft.; the South A., in

Monte Amara, a height of 9,000 ft.; the Insular A., if we exclude the isolated peak of Ætna—in Pizzo di Case—a height of 6,500 feet.

The A. are crossed by thirteen principal passes and by eight railroads. The passes are, proceeding from n. to s.: 1. The Pass of Savona; 2, of Bocchetta; 3, of Cisa, 4. of Monte Cimone; 5, of Porretta; 6, of Pietramala; 7, of Borgo San Sepolcro; 8, of Furlo; 9, of Serravalle; 10, of Aquila; 11, of Isernia; 12, of Arcano and Troja; 13, of Potenza. The prevalent stone is a species of compact limestone, of a whitish-gray color, belonging to the Jura formation. Resting on the limestone is a more recent formation of sandstone and marl, especially abundant in the middle region of the Sub-A., containing an extraordinary number of petrifactions, and reckoned as belonging to the upper division of the Parisian limestone. Older formations, however, frequently crop out. Thus, on the water-shed of the North and Central A. there are found transition clay-slate, grauwacke-slate, etc. The A., especially the Roman and Neapolitan, are distinguished from all other mountain-chains by the rich variety of marbles which they contain. In some places the quarries seem inexhaustible. Volcanic rocks are numerous in the middle and s. regions, where the agency of fire has caused very wonderful formations, as, for instance, the crater-lakes of Albano, Nemi, Vesuvius, Solfatara.

The principal chain exhibits, for the most part, a dreary and barren appearance; it looks like a vast wall, with very few projecting peaks to break the dull monotony of the scene, and therefore seldom furnishes any salient points on which the eye of the spectator can rest with pleasure. Naked, riven, covered with thick *débris*, the declivities seem as if scorched by the southern sun. Only in the Abruzzi, in the Sub-A., and above all, in the marble mountains of Carrara and Seravezza, do the bold and magnificent forms of the Alps reappear. Where the A. —in general so poorly supplied with streams—exhibit a trace of Alpine abundance of water, there is no lack of rich pastures and dense forests, but usually only thin grass and wild scrubby bushes cover the stony slopes. The greater number of the roaring forest brooks, in the deep rocky ravines, disappear during summer, leaving a dry bed. Where the mountains dip down to the sea, as at the Riviera of Genoa and the Gulf of Naples, a rich, peculiarly southern vegetation clothes the declivities. Gigantic agaves, Indian figs (*Cactus Opuntia*), myrtle-bushes, orange-groves, hint in these northern lands of the splendors of the tropics. Up to 3,000 ft. of elevation, cornfields, fruit-bearing chestnuts, and deciduous oaks are found. Beyond this, all vegetation often ceases on the steep and stony sides of the mountains; but at other times the beech or the fir appears in dense forests. There is no region of perpetual snow; but the summits of the Abruzzi and the lofty peaks of Lunigiana are often covered with snow from October far into May, and send their icy

breath so suddenly down into the mild valleys that the temperature in a few hours sinks 12°-18° F., and a warm spring afternoon is succeeded by a cold December evening. APENNINE, a. pertaining to the Apennines.

APENRADE, *â′pėn-râ′dė:* town in the Prussian prov. of Schleswig-Holstein; at the bottom of a gulf in the Little Belt; with an excellent harbor and considerable shipping. The environs of the town are beautiful. The first historical mention made of A. relates to its destruction by the Slaves in 1148; and, indeed, its position has always laid it open to the casualties of northern war, whether on a large or small scale, as has been especially seen since 1848. Near the town stands the castle of Brundlund, built by Queen Margaret in 1411, in which the bailiff of the place resides. Pop. 6,616.

APERIENT, n. *ă-pēr′ĭ-ĕnt* [L. *aperien′tem*, opening]: a medicine that opens the bowels; a laxative: ADJ. opening; gently purgative. APERITIVE, a. *ă-pĕr′ĭ-tĭv*, purgative.

APERTURE, n. *ăp′ėr-tūr* [L. *apĕrtūră*, an opening—from *aperĭō*, I uncover]: an opening; a cleft or gap.

APETALOUS, a. *ă-pĕt′ă-lŭs* [Gr. *a*, without; *pĕtalon*, a flower-leaf]: in *bot.*, having no petals or flower-leaves. APET′ALOUS′NESS, n.

APETALOUS: a term in Botany, applied to flowers or to flowering plants, and signifying that they are destitute of petals or corolla (q.v.). When both the calyx and corolla are wanting, the flower is said to be *achlamydeous* (from the Greek *chlamys*, a covering), or naked. The absence of the whorl of petals sometimes occurs in an exceptional manner in orders or genera ordinarily characterized by its presence. In some plants, as in certain species of the order *Caryophyllaceæ*, petals are sometimes present, sometimes absent, a tendency apparently existing to the suppression of this whorl.

APEX, n. *ā′pĕks*, APEXES, n. plu. *ā′pĕks-ĕs*, or APICES, n. plu. *ăp′ĭ-sēz* [L. *apex* or *ăpĭcem*, a point]: the top point or summit of anything. APICAL, a. *ăp′ĭ-kăl*, relating to the top. APICULUS, n. *ă-pĭk′ū-lŭs* [dim. of *apex*]: in *bot.*, a short but sharp point in which a leaf or other organ terminates, but not very stiff. APICULATE, a. *ă-pĭk′ū-lāt*, suddenly terminated by a distinct point.

A′PEX, in mining: the highest point of outcrop of a mineral vein or lode. This is the common definition of the term as used by miners, although its legal significance must be interpreted in connection with the local conditions and cannot be defined in general terms. According to the Revised Statutes of the United States for 1872 the owner of a mineral claim which includes the apex is allowed to follow the vein along the dip for an indefinite distance without regard to the ownership of the overlying surface, so that the proper location of the apex is of the utmost importance in establishing the lines for a claim. It has been decided by the courts that the apex need not appear necessarily at the surface, and hence the

term does not exactly coincide with the term outcrop. In the case of an inclined vein whose apex is concealed but which outcrops at some point lower down, the right of mining is conveyed to the owner of the apex-claim in preference to the owner of the outcrop-claim. This law has been the cause of much confusion and of expensive litigation in settling the ownership of valuable mining properties in the western states. A wiser provision is that obtaining in most European countries, which grants the owner the right of mining only within the vertical limits of his claim.

APEX OF THE SUN'S WAY: a term signifying the point in the constellation Hercules to which the sun's motion in space is directed. This point is about in right ascension 18 hours 30 minutes, and declination 35° north. The point is therefore somewhat south of the zenith for most of the United States in the early part of the evenings of August. Of course this statement is meant to indicate the locality only in the most general way. That the solar system is moving toward this part of the heavens is indicated by the apparent spreading apart of the stars in this region, together with an apparent crowding together of the stars in the opposite direction, as the trees open in front of one walking through a grove and shut together behind him. The velocity of this motion is shown by spectroscopic observation to be about 11 miles per second. The movement, so far as observed, seems to be in a straight line but may turn out to be in a vast curved orbit.

APHAN'ESITE, *ă-făn'e-sīt* (from the Greek *aphanes*, 'obscure,' in allusion to the difficulty of recognizing it by its crystals), a mineral now better known as CLINOCLASITE.

APHÆRESIS or APHERESIS, n. *ă-fē'rĕ-sĭs* [Gr. *aphai, rĕsis*, a taking away, abstraction—from *apo*, from *hairĕō*- I take or seize]: the taking away a letter or syllable from the beginning of a word.

APHANIPTERA, n. *ăf'ăn-ĭp'tĕr-ă* [Gr. *apha'anēs*, unseen, not apparent—from *a*, not; *phaino*, I show; *pteron*, wing]: old order of insects, comprising fleas, apparently without wings. APH'ANIP'TEROUS, a. *-ŭs*, pert. to.—This order of wingless insects has a sucker of three pieces and a true metamorphosis. The thorax is distinctly separate from the abdomen, and two horny plates mark the spots where wings would be in the higher insects. It contains the *Pulicidæ*, or fleas.

APHANITE, n. *ăf'ăn-īt* [Gr. *apha'nēs*, obscure, not apparent—from *a*, not; *phaino*, I bring to light]: a compact sort of trap-rock, consisting of hornblende, quartz, and felspar so intimately combined that they cannot be individually distinguished. APHANISTIC, a. *ăf'ăn-ĭs'tĭk*, pertaining to; indistinct.

APHASIA, n. *ă-fā'zhĭ-ă* [Gr. *apha'sĭă*, inability to speak

from amazement or fear—from *a*, not; *phăō*, I speak]: in *med.*, loss of the cerebral faculty of speech. It was first definitely connected with a cerebral lesion by Broca, 1861, who found in two cases that loss of speech was accompanied by injury of the third frontal convolution. Later (1874) Wernicke discovered cases in which aphasia was due to injury of the temporal lobe, the cerebral centre for hearing. For a time it was customary to distinguish two forms, motor (Broca) and sensory (Wernicke). There are now added cases due to injury of the association tracts, and forms due to injury of the sight or reading centre (alexia). Other classifications are based on the close connection between generalization and speech and injury of areas involved in the formation of concepts in addition to the simple centres (motor or sensory). Probably these refinements of classificaton are not supported by facts. Indeed very recently Marie (1906–7) has failed to confirm the results of Broca, as a result of some fifty autopsies, and inclines to the opinion that there is but one general area involved in all cases of aphasia, the area of Wernicke. Consult Baldwin, *Dictionary of Philosophy and Psychology*, article entitled *Speech and its Defects* (1903); Collins, *The Genesis and Dissolution of the Faculty of Speech* (1898); Bastian, *aphasia and other speech Defects* (1898); Elder, *Aphasia and the Cerebral Speech Mechanism* (1897) (with bibliography); Küssmaul, article in *Ziemssen' Encyclopedia of Medicine*, Vol. XII.

APHELION, n. *ă-fēl'yŭn*, APHELIA, n. plu. *ă-fē'lĭ-ā* [Gr. *apo*, from; *hēlĭŏs*, the sun]: that point in the elliptical orbit of the planet which is most remote from the sun. The opposite point, or that nearest to the sun, is the PERIHELION. At the former point, the swiftness of the planet's motion is least, and begins to increase; at the latter, it is greatest, and begins to decrease. This irregularity of motion is most remarkable in comets whose orbits deviate most from the circle. See APSIDES.

APHEMIA, n. *a-fē'miä* [Gr. *a*, without; *pheme*, speech]: a term used to denote loss of speech due to cerebral defect. Now used as the equivalent of motor aphasia, or aphasia of Broca. In older works, and occasionally in more modern, used as the equivalent of aphasia in general, a use at present deprecated by the better authorities.

APHIS, n. *ā'fĭs*, APHIDES, n. plu. *ăf'ĭ-dēz* [L.]: genus of insects belonging to the order Hemiptera, sub-order Homoptera—type of a family called *Aphididæ*. They are small insects, often called plant-lice, which suck the juices of plants or trees which they thus injure and sometimes destroy. Different species, of which there are several hundred, prey on different portions of the plant or tree; but no part, from the root to the leaf, is exempt from their attacks. The woolly A. (*Schizoneura lanigera*), often destructive to young apple trees, appears in two forms, one of which preys on the roots and the other on the trunks and branches. It secretes a woolly substance which tends

to protect it from dampness in the soil and from enemies above ground. The *A. mali* attacks the leaves and young twigs of the apple. Other species prey on the cherry, peach, and other fruit trees, and on the willow, white pine, and other ornamental and timber trees. A species which preys on the plum migrates to the hop plant and often does great damage (see HOP FLY). The *Anthomyia bras-*

Apple Aphis (*Eriosoma Mali*):
a, wingless insect, magnified; *b*, wingless insect in excrescence of the tree, magnified.

sicæ is exeeedingly destruetive to the cabbage and turnip, and nearly all field, garden, and greenhouse plants are subjeet to injury by some species of A. The prineipal remedies are for the root A., either kainit or refuse tobaeeo powder mixed through the soil by digging: and for those whieh work above ground, the use of kerosene emulsion (see EMULSION) or of a deeoction of tobacco.

Apple Aphis:
a branch with excrescences, reduced.

Whatever tends to keep the plants and trees in vigorous condition will tend also to prevent attaeks by the A., and will lessen the degree of injury if an attack is made. It is very common to see the leaves of trees and shrubs deformed by red eonvexities. In the hollows of the under side of these, aphides live and find their food; the exhausted leaf at last curls up. They have a proboscis (*haustellum*), by which they pierea

and suck plants; and at the extremity of the abdomen, two horn-like processes, from which exude frequent small drops of a saccharine fluid called *Honey-dew*, a favorite food of ants. For the means which ants take to obtain this food, see ANT. The legs of aphides are long, and they move slowly and awkwardly by them. The greater number of them never have wings; it is in the autumn that perfect winged insects generally appear. From the pairing of these result eggs, which produce female aphides in the following spring, and successive generations of wingless aphides are produced in a viviparous manner without impregnation throughout the summer, after which winged aphides again appear. Their increase is restrained not only by birds, but by insects which feed on them. A family of coleopterous insects, to which the genus *Coccinella* or Lady-bird (q.v.) belongs, has received upon this account the name of *Aphidiphagi*, or aphis-eaters. There are also certain minute hymenopterous insects, which destroy them in great numbers by depositing their eggs in them; the larva feeds upon the living A., out of which it at last eats it way, leaving a mere desiccated skin.

APHLOGISTIC, a. *ăf'lō-jĭs'tĭk* [Gr. *a*, without; *phlogi'zo*, I burn up]: flameless.

APHONIA, n. *ă-fō'nĭ-ă*, or APHONY, *ăf'ŏ-nĭ* [Gr. *a*, without; *phōnē*, voice]: a loss of voice: distinct from mutism, in which it is impossible to form articulate sounds, and in most cases the voice is not entirely gone, but only more or less suppressed. The voice is essentially produced (see VOICE) by three distinct agents—viz., (1) the expiration of air, (2) the opening of the glottis, and (3) the tension of the vocal cords; hence anything interfering with expiration, or with the functions of the glottis and vocal cords, may cause aphonia. Thus, it may result from paralysis of the respiratory muscles, from pulmonary emphysema, and sometimes from pneumonia; or it may be caused by diseases of the larynx, or by pressure on the larynx by abscesses, vegetations, and any kind of morbid growth; or it may be traced to some functional or organic disturbance of the vocal cords. Not infrequently, A. may be traced to compression by an aneurysm, an abscess, or a solid tumor of the recurrent or inferior laryngeal nerve, which is the nerve supplying motor power to all the muscles of the larynx, with one trifling exception. In the same way, a wound or contusion of the pneumogastric nerve, or one of the recurrent branches, will cause A. The condition is, moreover, very commonly associated with hysteria. When aphonia is not due to irremovable causes, as tumors pressing on the recurrent nerve, fatty degeneration of the laryngeal muscles, etc., it generally disappears after a longer or shorter interval.

APHORISM, n. *ăf'ō-rĭzm* [Gr. *aphoris'mos*, a definition —*apo*, from; *hŏrīzō*, I mark bounds or limits]: a phrase limited or terminated in its meaning; a short sentence expressing some important truth; a maxim, such as 'Habit is

second nature.' The aphoristic style continued through extended writings, is at times impressive, but too long continued it grows wearisome. APHORISTIC, a. *ăf'ŏ-rĭs-tĭk*, or APH'ORIS'TICAL, a. *-tĭ-kăl*, expressing some truth in a short sentence. APH'ORIS'TICALLY, ad. *-lĭ*. APH'ORIST, n. *-rĭst*, one who.—SYN. of 'aphorism': proverb; apothegm; byword; axiom; maxim; saying; adage; saw; truism; principle.

APHRITE, n. *ăf'rīt* [Gr. *aphros*, froth or foam]: a scaly variety of calcareous spar, having a shining pearly lustre and a greasy feel.

APHRODISIAC, a. *ăf'rō-dĭz'ĭ-ăk* [Gr. *aphrodis'ĭŏs*, pertaining to Venus]: that which excites to sexual intercourse.

APHRODITE, *ăf-rō-dī'tē:* the Greek name of Venus; according to various traditions, derived from *aphros* (foam), in allusion to the old poetical myth which represented the goddess as springing from the foam of the sea. See VENUS: APELLES. *Aphrodisia* were festivals celebrated in honor of A., in numerous cities of Greece, but especially in Cyprus. At Paphos, in this island, was her most ancient temple. Bloodless sacrifices alone were imagined to please A., such as flowers, incense, etc. Myteries of an impure kind formed part of the ceremonial of the Aphrodisia.

APHTHÆ, n. *ăf-thē* [Gr. *aphthai*, ulcers in the mouth]: small white specks or sores on the tongue, gums, palate, etc.; thrush; small vesicles formed of the superficial layer of a mucous membrane, elevated by fluid secreted by the latter. They are usually whitish in color, and the fluid may be serous or puriform. At the end of a few hours or days, the aphthous vesicle bursts at its summit, and shrivels up, exposing an inflamed and painful patch of the mucous membrane. The most common site of A. is the mucous membrane of the lips and mouth, but they occasionally appear wherever the mucous membrane approaches the skin. In ordinary cases of A., a preparation of borax, or some astringent wash, generally effects a rapid cure. APH'THOUS, a. *ăf'thŭs*, pertaining to thrush, or ulcerous affections of the mouth. APHTHOID, a. *ăf'thoyd* [Gr. *eidos*, resemblance]: resembling aphthæ.

APHTHONG, n. *ăf'thŏng* [Gr. *a*, without; *phthonggos*, a sound]: a silent letter or letters.

APHYLLOUS, a. *ăf-fĭl'lŭs* or *ăf'-* [Gr. *a*, without; *phullon*, a leaf]: in *bot.*, destitute of leaves; having leaves suppressed. APHYLLY, n. *ăf'ĭl-lĭ*, the suppression or want of leaves.

APIARY, n. *ā'pĭ-ăr'ĭ*, A'PIAR'IES, n. plu. *-ăr'ēz* [L. *apĭā'rĭum*, a bee-house—from *apis*, a bee]: a stand or shed for bees; a place where bees are kept. See BEE. A'PIAR'IST, n. one who rears bees. A'PIA'RIAN, a. *-ā'rĭ-ăn*, relating to bees. APICULTURE, n. *ā'pĭ-kŭl'tūr* [L. *cultūra*, a cultivating]: rearing of bees for their honey and wax.

APICIFIXED, a. *ă-pĭs'ĭ-fĭkst* [L. *apex* or *ăpĭcem*, a point: Eng. *fixed*]: in *bot.*, fixed apex to apex, as the apex of the filament attached to the apex of the anther.

APICIUS, *a-pĭsh'ĭ-us*, Marcus Gabius: a Roman epicure, in the times of Augustus and Tiberius; celebrated for his luxurious table and his acquirements in the art of cookery. When, by the gratification of his favorite indulgence, he had consumed the greater part of his fortune, and had only some $400,000 left, he poisoned himself, in order to avoid the misery of plain diet. Two other gourmands—one in the time of Pompey, the other in the reign of Trajan—are mentioned under the name Apicius. The Roman cookery-book, *Cœlii Apicii de Obsoniis et Condimentis sive de re Culinariâ* (libri decem), ascribed to A., belongs to a much later time, inasmuch as it abounds in inaccuracies and solecisms. Its author, *Cœlius*, has thought proper to recommend his work to gourmands by affixing to it the celebrated name of Apicius.

APIECE, ad. *ă-pēs'* [AS. *a*, to or on, and *piece*] to each, as a separate share.

APIOCRINITE, n. *ăp'ĭ-ŏk'rĭn-īt* [Gr. *apĭŏn*, a pear; *krinon*, a lily]: a fossil crinoid, abundant in the Bradford clay; the pear-encrinite.

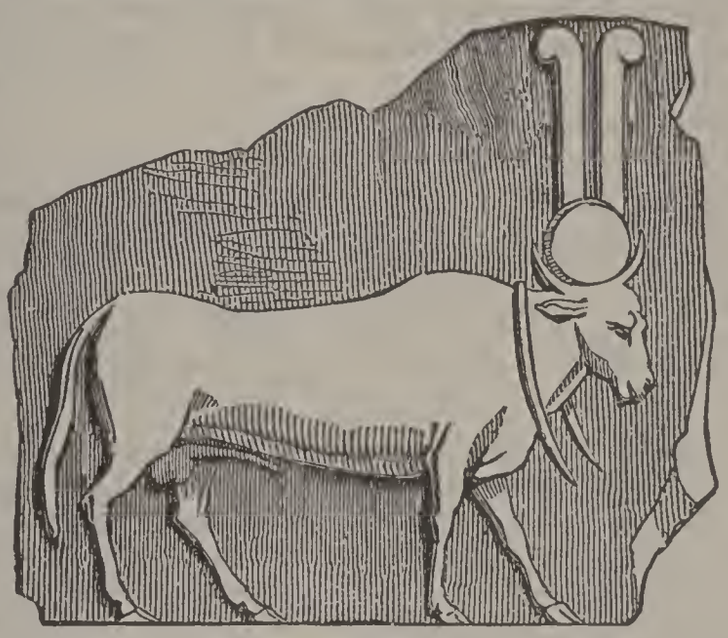
APION, *a-pĭ-ŏn*, Greek grammarian: b. at Oasis, a town in Libya, but educated in Alexandria, which he affected to consider his birthplace, from a desire of being thought a pure Greek. He studied under Apollonius, the son of Archibius, from whom he acquired an admiration of Homer, and afterwards went to Rome, where he succeeded Theon as teacher of rhetoric. He was as remarkable for his loquacious vanity as for his knowledge. He declared that himself, and every one whom he mentioned, would be held in immortal memory; that he was equal to the first philosophers of Greece, and that Alexandria should be proud of him. From his bragging, Tiberius used to call him *Cymbalum Mundi* (the cymbal of the universe).

With the exception of one or two fragments, the whole of A.'s numerous writings are lost. He composed a work on the text of Homer, partly in the form of a dictionary, frequently referred to by subsequent authors; a work on Egypt, which contained the far-famed story of *Androclus and the Lion*, preserved by Aulus Gellius; a work against the Jews; one in praise of Alexander the Great; another on the great epicurean Apicius; histories of various countries, etc.

APIOS TUBEROSA, *ā'pĭ-ŏs tū-bĕr-ō'sa:* ground nut or wild bean (called *Glycine Apios* by Linnæus): plant belonging to the natural order *Leguminosæ*, sub-order *Papilionaceæ*, having tuberous roots, a twining stem, dark red flowers, leathery, two-valvular legumes, and pinnate leaves, with seven pair of smooth ovato-lanceolate leaflets. This plant, a native of N. Amer., has for a century been cultivated in botanic gardens in Europe, and has recently been brought into particular notice on the continent, largely through the French traveller Lamare-Picquot, who, during his travels in N. Amer., convinced himself of the value of the tubers as

an article of food, for which they are there used to some extent. Various attempts have since been made to cultivate it like the potato; but its cultivation is found difficult, because of the length and weakness of the twining shoots, and the length of the roots. The tubers cooked in steam are free from all acridity and bitterness, and very much resemble potatoes dressed in the same way. They contain more nitrogen than potatoes (4·5 per cent.), also more starchy farina (33·55 according to an analysis by Payen).

APIS, n. *ā'pis* [L. and Gr. *Apis*]: the sacred bull, worshipped with divine honors by the ancient Egyptians, who regarded it as a symbol of Osiris, the god of the Nile, the husband of Isis, and the great divinity of Egypt. A sacred court or yard was set apart for the residence of A. in the temple of Ptah at Memphis, where a numerous retinue of priests waited upon him, and sacrifices of red oxen were offered to him. His movements, choice of places, and changes of appetite, were religiously regarded as oracles.



Apis.—Golden Calf.

It was an understood law that A. must not live longer than 25 years. When he attained this age, he was secretly put to death, and buried by the priests in a sacred well, the popular belief being that he cast himself into the water. If, however, he died a natural death, his body was solemnly interred in the Temple of Serapis at Memphis, and bacchanalian festivals were held to celebrate the inauguration of a new bull as A. As soon as a suitable animal was found having the required marks—black color with a white square on the brow; the figure of an eagle on the back, and a knot in the shape of a cantharus under the tongue—he was led in triumphal procession to Nilopolis at the time of the new moon, where he remained 40 days, waited upon by nude women, and was afterwards conveyed in a splendid vessel to Memphis. His Theophany, or day of discovery, and his birthday, were celebrated as high festivals of seven days'

duration during the rise of the Nile. The worship of the golden calf by the Israelites in the wilderness, and also the employment of golden calves as symbols of the Deity by Jeroboam, have been very generally referred to the Egyptian worship of Apis.

A'PIS, APIDÆ: see BEE.

AP'ISH, etc.: see under APE.

A'PIUM: see CELERY.

APLACENTALIA, n. plu. *ăp'lăs-ĕn-tā'lĭ-ă* [Gr. *a*, without; Eng. *placenta*]: the section of the Mammalia, including the Didelphia and Monadelphia, in which the young is not furnished with a placenta. See PLACENTA.

APLANATIC, a. *ăp'lăn-ăt'ĭk* [Gr. *a*, without; *planăō*, I wander]: applied to a telescope or lens which entirely corrects the aberration of the rays of light.

APLOMB, n. *ă-plŏm'* or *ă-plŏng* [F. *à plomb*, to the lead, perpendicular line—*lit.*, true to the plumb-line]: the self-possession which arises from perfect self-confidence; the settling down into its fit place as if it were naturally.

APNŒA, n. *ăp-nē'ă* [Gr. *a*, without; *pneō*, I breathe]: loss of breath; suffocation.

APO, *ăp'ō*: a Greek prefix signifying 'away'; 'from.'

APOCALYPSE, n. *ă-pŏk'ă-lĭps* [F.—from L. *apocalyp'sis*; Gr. *apokalup'sis*, an uncovering—from Gr. *apo*, from; *kalup'to*, I cover, or conceal]: an uncovering of hidden things; a revelation; a vision; the last book of the New Testament. See REVELATION OF JOHN. APOCALYPTIC, n. *ă-pŏk'ă-lĭp'tĭk*, or APOC'ALYP'TICAL, a. *-tĭ-kăl*, pertaining to revelation. APOC'ALYP'TICALLY, ad. *-kăl-lĭ*.

APOCALYP'TIC NUMBER: 'the mystical number' 666, spoken of Rev. xiii. 18. As early as the 2d c., the church had found that the name Antichrist was indicated by the Greek characters expressive of this number; while others believed it to express a date. Various interpretations have been suggested; but the mystery remains. One of the most probable interpretations is that which was current in the days of Irenæus, and which found the number in the word *Lateinos* (*Latinus*) applied to pagan Rome. The Roman nation—the mightiest pagan power on earth—was the most terrible symbol of Antichrist, and the number 666 appears in the Greek characters which spell the name. Many Protestant controversialists have supported their views by this interpretation, applying the prophecy to papal Rome; but this opinion of late finds fewer advocates among Protestant scholars.

APOCARPOUS, a. *ăp'ō-kär'pŭs* [Gr. *apo*, from; *karpos*, fruit]: applied to fruits when their carpels are either quite separate or only partially united. A. FRUITS, in *bot.*, are those fruits which are the produce of a single flower, and are formed of only one carpel, or of a number of carpels remaining free and separate from each other.

A POCO A POCO, *ä pō'kō ä pō'kō* [Ital.]: in Music, by degrees; by little and little.

APOCOPE, n. *ă-pŏk′ō-pē* [Gr. *apo*, from; *kopto*, I cut]: omission of the last letter or syllable of a word. APOC′OPAT′ED, a. shortened by cutting off the last letter or syllable.

APOCRENIC ACID, *ă-po-krĕn′ĭk-*: one of the products of the natural decay of wood and other plant textures; found wherever lignine or woody fibre is decomposing in soils, etc. As A. A. is soluble in water, it follows that rain-water falling on and percolating through soils containing this substance, becomes impregnated with it; and hence, in many natural waters, A. A. is a recognized constituent. A. A. performs an important function in the growth of plants, as there is every reason to believe that it forms one of the stages through which matter travels from dead plants again into the living vegetable tissue.

APOCRYPHA, n. *ă-pŏk′rĭ-fă* [Gr. *apo*, from, or intensive; *krupto*, I hide]: things wholly kept back or concealed; certain disputed books received as parts of inspired Scripture by Rom. Catholics and others, but generally rejected by Protestants. APOCRYPHAL, a. *ă-pŏk′rĭ făl*, doubtful; uncertain. APOC′RYPHALLY, ad. *-lĭ*. APOC′RYPHALNESS, n.

APOC′RYPHA, or APOCRYPHAL WRITINGS: originally meant *secret* or *concealed*, and was rendered current by the Jews of Alexandria. In the earliest churches, it was applied with very different significations to a variety of writings. Sometimes it was given to those whose authorship and original form were unknown; sometimes to writings containing a hidden meaning; sometimes to those whose public use was not thought advisable. In this last signification, it has been customary, since the time of Jerome, to apply the term to a number of writings which the Septuagint had circulated among the Christians, and which were sometimes considered as an appendage to the Old Testament, and sometimes as a portion of it. The Greek Church, at the Council of Laodicea (360), excluded them from the canon; the Latin Church, on the other hand, always highly favored them; and finally the Council of Trent (1545-63) placed them on an equality with the rest of the Old Testament. The Church of England uses them in part for edification, but not for the 'establishment of doctrine.' All other Protestant churches in England and America reject their use in public worship. But it was formerly customary to bind up the A. between the authorized versions of the Old and New Testaments, though this has now ceased, and, as a consequence, this curious, interesting, and instructive part of Jewish literature is now known to comparatively few besides scholars. The Old Testament A. consists of 14 books: 1. First Esdras (q.v.); 2. Second Esdras (q.v.); 3. Tobit (q.v.); 4. Judith (q.v.); 5. The parts of Esther not found in Hebrew or Chaldee; 6. The Wisdom of Solomon; 7. The Wisdom of Jesus, son of Sirach, or Ecclesiasticus (q.v.); 8. Baruch (q.v.); 9. The Song of the Three Holy Children; 10. The History of Susanna; 11. The History of the Destruction of Bel and the Dragon (q.v.); 12. The Prayer of Manasses

King of Judah (see MANASSEH); 13. First Maccabees (q.v.); 14. Second Maccabees (q.v.). The precise origin of all of these writings cannot be ascertained. It is enough to state here that some bear traces of a Palestinian, others of an Egypto-Alexandrine, and others, again, of a Chaldaico-Persian origin or influence. Most, if not all, bear internal evidence of having been composed in B.C. 1st and 2d c.

The A. of the New Testament may be arranged under three heads: 1. The writings comprising the *Apocryphal Gospels*, which consist of 22 separate documents, 10 in Greek and 12 in Latin. They concern themselves with the history of Joseph and the Virgin Mary before the birth of Christ, with the infancy of Christ, and with the history of Pilate. The most important of the set are the *Protevangelium of James*, the *Gospel of Thomas*, and the *Acts of Pilate*, which are perhaps the *origines* of all the apocryphal traditions. That many of the stories found in these were current in the 2d c. is abundantly proved, but we have no evidence that any of the books known as Apocryphal Gospels were then in existence, or are older than the 4th c. 2. The *Apocryphal Acts of the Apostles*, consisting of 13 documents originally written in Greek, but found also in a Latin compilation probably of the 6th c. They are distinguished from the Apocryphal Gospels by having less of miracle and more of didactic discourse. The more important of the collections are *The Acts of Peter and Paul*, *The Acts of Barnabas*, *The Acts of Philip*, *The Acts of Andrew*, *The Acts of Bartholomew*, and *The Acts of John*. It is difficult to ascertain their age. Some are probably of earlier date than the Apocryphal Gospels, but the original MSS. are lost and we have them only in late transcripts of the middle ages. 3. The *Apocryphal Apocalypses*, consisting of seven documents, four of which are called apocalypses by their authors. There is great and perplexing variety in the MSS. That called *The Apocalypse of Moses* relates rather to the Old Testament than to the New; so does *The Apocalypse of Esdras*, a weak imitation of the Fourth Book of Esdras. The others are *The Apocalypse of Paul*, *The Apocalypse of John*, and *The Assumption of Mary* in three forms. These, too, exist only in late MSS. of the middle ages, and it is, of course, not quite certain that they are the same in form as the works bearing the same name referred to in the writings of the Fathers. The New Testament A. throws a flood of light upon the workings of the early Christian consciousness, and enables us to see the superiority of the canonical Scriptures.—See B. Harris Cowper, *The Apocryphal Gospels* (5th ed. 1881); and Canon Churton, *The Uncanonical and Apocryphal Scriptures* (1885).

APOCYNACEÆ, *ă-pŏs'ĭ-nā'sē-ē*, or APOCY'NEÆ: a natural order of Dicotyledonous plants consisting of trees and shrubs, generally with milky juice, having entire leaves, and no stipules. The calyx is usually 5-partite, persistent;

the corolla hypogenous, monopetalous, often with scales in its throat, regular, 5-lobed, twisted in bud. There are five stamens, which are inserted on the corolla; the anthers adhere firmly to the stigma, to which the pollen is immediately applied; the anthers are 2-celled, and open longitudinally; the pollen is granular. The ovaries are two, each 1-celled; or one, 2-celled; ovules usually numerous; styles one or two; the stigma is contracted in the middle, and peculiarly characteristic of the order. The fruit is a follicle or capsule, or drupe or berry, double or single. The seeds have a fleshy or cartilaginous albumen, or (rarely) are ex-albuminous. There are about 566 known species, chiefly natives of tropical countries. The PERIWINKLE (q.v.) is its only representative in the flora of Britain, a wanderer, as it were, from the tropics, yet hardy enough for the climate with which it has to contend; the OLEANDER (q.v.) and a few others are found in the s. of Europe. Many species are poisonous; among which is the noted TANGHIN (q.v.) or TANGHEENA of Madagascar. Some are used in medicine, in India and other countries. A number of species yield CAOUTCHOUC (q.v.). The milk of others is bland and wholesome, as the HYA HYA or COW-TREE (q.v.) of Demerara. Some are used in dycing; *Wrightia tinctoria* yields indigo of good quality. A number yield eatable fruits, as *Willughbeia edulis* and *Carissa Carandas* in India; *Carissa edulis* in Arabia, and certain species of *Carpodinus*, called PISHAMIN in Sierra Leone, and *Hancornia*. *Apocynum cannabinum*, Indian hemp, a herbaceous plant about 4—5 ft. in height, with unbranched stem, oblong leaves, and lateral cymes of whitish bell-shaped flowers, yields a very strong fibre, which the Indians of North America employ for making twine, cloth, fishing-nets, etc.

APODA, n. plu. *ăp'ō-dă* [Gr. *a*, without; *podes*, feet]: those fishes which have no ventral fins. APODAL, a. *ăp'ō-dăl*, destitute of feet; applied also to such fishes as the eel, sword-fish, wolf-fish, etc., which have no ventral fins. In the Linnæan system, the *Apodes* are an order of Fishes, in which genera not otherwise nearly allied are brought together; but in the systems of Cuvier and other recent naturalists, a less important place is assigned to this distinctive character. APODIA, n. *ăp-ō'di-ă*, the absence of feet.

APODEMA, n. plu. *ăp-ŏd'ĕ-mă* [Gr. *apo*, from; *dĕma*, a cord, a bond; *demăta*, cords or bonds]: certain appendages on the bodies of Articulata giving attachment to muscles, or articulating with wings and the like. APODEMATA, n. plu. *ăp'ō-dĕm'ă tă*, certain chitinous septa which divide the tissues in the Crustacea.

APODICTIC, *ăp'ō-dĭk'tĭk:* a logical term signifying a judgment or conclusion which is necessarily true: or, in other words, a judgment of which the opposite is impossible. No. A. judgment can be founded on experience, because experience does not supply the idea of an absolute necessity.

APODIXIS, n. *ăp'ō-dĭks'is* [L. *apŏdix'ĭs;* Gr. *apodeix'is*, a setting forth—from Gr. *apo*, *deik'numi*, I show]: full

demonstration. APODICTIC, a. *ăp′ō-dĭk′tĭk*, or AP′ODIC′TICAL, a. *-tĭ-kăl*, evident beyond contradiction; clearly proving. AP′ODIC′TICALLY, ad. *-lĭ*.

APODOSIS, n. *ă-pŏd′ŏ-sĭs* [G. *apŏdŏsis*, conclusion—from *apo*, from; *didōmi*, I give]: in *gram.*, the consequent clause in a conditional sentence, expressing the result—the clause expressing the condition being called the *protasis*.

APOGEE, n. *ăp′ō-jē* [Gr. *apo*, from; *gē*, the earth]: properly speaking, the greatest distance of the earth from any of the heavenly bodies. Its application, however, is restricted to the sun and moon, the sun's A. corresponding to the earth's aphelion and the moon's A. being the point of its orbit most remote from the earth. A. is opposed to perigee. APOGEAN, a. *ăp′ō-jē′ăn*, pertaining to.

APOLDA, *â-pŏl′dâ:* town of the grand duchy of Saxe-Weimar-Eisenach, Germany; on the Werlitz, a feeder of the Saale, 8 m. n.e. from Weimar. It is a station on the Thuringian railway, between Weimar and Weissenfels, and a place of much industrial activity, having extensive manufactures of woolens and hosiery. Pop. 20,352.

APOLLINARIS, *a-pŏl-ĭ-nā′rĭs*, the Younger: Bishop of Laodicea in Syria (362); and one of the warmest opponents of Arianism. Both as a man and as a scholar, he was held in the greatest reverence; and his writings were extensively read in his own day. His father, A. the Elder, who was presbyter of Laodicea, was born at Alexander, and taught grammar, first at Berytus, and afterwards at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavored to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; while the New Testament formed the groundwork of dialogues in imitation of Plato. It is not ascertained what share the father had in this work, but as he had a reputation for poetry, he probably put the Old Testament into Greek verse. But it was chiefly as a controversial theologian, and as the founder of a sect, that A. the Younger is celebrated. He maintained the doctrine that the *logos*, or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualized and glorified form of humanity. This doctrine was condemned by several synods, especially by the Council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread rapidly in Syria and the neighboring countries, and, after the death of A., divided itself into two sects—the Vitalians, named after Vitalis, Bp. of Antioch; and the Polemeans, who added to the doctrine of A. the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration. On this account they were accused of *sarcolatria* (worship of the flesh) and *anthropolatria* (worship of man), and also were styled *synousiastai* (*syn.*, together, and *ousia*, substance), because they confused to-

gather the two distinct substances. The whole controversy, which occupied a great part of the 5th c., is an instance of human reason wandering out of its proper sphere. A. must not be confounded with Claudius A., Bp. of Hierapolis, in Phrygia (170).

APOLLINARIS WA'TER, *â-pŏl-lĭ-nā'rĭs:* alkaline mineral water containing carbonate of soda, from the Apollinaris Spring, in the valley of the Ahr, in the Rhine province. It is largely imported into the United States.

APOLLO, n. *ă-pŏl'lō* [L. and Gr. *apŏllō*]: a god of the anc. Greeks and Romans, worshipped under varions names. A. may be regarded as the characteristic divinity of the Greeks, inasmuch as he was the impersonation of Greek life in its most beautiful and natural forms, and the ideal representative of the Grecian nation. His mild worship, with its many festivals, accompanied as they were by cessation from all hostilities; his various shrines at sacred places, with their oracles, and the general idea of his character, had a wide, powerful, and beneficent influence on social and political life throughout the states of Greece. Homer and Hesiod mention that he was the son of Zeus and Leto, but neither states where he was born. The Ephesians believed that both he and Diana, his sister, were born in a grove near their city. The Tegyræans of Bœotia, and the inhabitants of Zoster in Attica, also claimed the honor of his birth; while the Egyptians seemed to think he properly belonged to them; but the most popular legend was that which made him a native of Delos, one of the Cyclades, where his mother Leto, followed by the jealous wrath of Juno over land and sea, at length found rest and shelter, and was delivered of him, under the shadow of an olive-tree, at the foot of Mount Cynthus. To spite the Queen of Heaven, who was far from being a favorite with the other goddesses, these hastened to tender their services to the weak and wearied Leto. The young A. was the object of great regard and care. Themis fed him with nectar and ambrosia, the food of the gods, which seems to have suddenly excited the conceit of the infant deity, inasmuch as he surprised his nurse by starting to his feet, demanding a lyre, and announcing his intention to reveal the will of Jove.

In ancient literature A. is described as possessed of many and various powers, all of which, however, are seen on closer inspection to be intimately related to each other. He is spoken of: 1. As the god of retributive justice, who, armed with bow and arrows, sends down his glittering shafts upon insolent offenders. In this character he appears in the opening of the *Iliad*. 2. As the instructor of bards, and the god of song or minstrelsy, playing upon the phorminx, or seven-stringed lyre, and singing for the diversion of the other deities when engaged in feasting. 3. As the god of prophetic inspiration, especially in his oracle at Delphi. 4. As the guardian deity of herds and flocks. 5. As the god of medicine, who affords help, and wards off evil. In this sense he is represented as the father of Asclepius (Æsculapius), the god of the healing art. 6. As a founder of cities. According to Homer, he assisted Neptune in

building the walls of Troy. Cyrene, Naxos in Sicily, and other cities, venerated A. as their founder. By the later writers, A. was identified with Helios, the sun-god, though Homer describes the latter as a distinct deity. Several critics, however, have regarded Helios, or the sun-god, as the true original A.—an opinion which may be supported by many probabilities. The supposition that A. was identical with the Egyptian deity Horus was rejected by the learned O. Müller, who generally opposed all attempts to deduce Grecian from Egyptian mythology. According to Müller's theory, A. was a purely Doric deity, whose first residence was in Tempe, and who afterwards removed to Delphi, whence the fame of his oracle was spread abroad, and made him to be recognized as the national divinity of Greece. The introduction of his worship into Attica appears to have been contemporaneous with the immigration of the Ionians, and that worship seems to have spread over the Peloponnesus, immediately after it was conquered by the Dorians. Much controversy has taken place, both with reference to the idea which lies at the root of the whole myth of the A. worship, and also as to whether this myth had its origin in the north of Greece or in Egypt. Even on the supposition that the original conception was derived from the latter source, it was to Greek art and philosophy that it owed its development into the ideal of humanity. The most celebrated oracles of A. were at Delphi, Abæ in Phocis, Ismenion in Thebes, Delos, Claros, near Colophon, and Patara in Lycia. Among the Romans, the worship of A. was practiced as early as B.C. 430, and prevailed especially under the emperors. But there can be no doubt that the Romans derived their conceptions of A. entirely from the Greeks. It was in honor of A. and his sister Diana that the *ludi sæculares* were celebrated every hundred years. The attributes of A. are the bow and quiver, the cithara and plectrum, the snake, shepherd's crook, tripod, laurel, raven, etc.; less frequently, the grasshopper, cock, hawk, wolf, and olive-tree. In sculpture, he is generally represented with a face beautifully oval, high forehead, flowing hair, and slender figure.

Apollo.

APOLLO BELVEDERE, *ă-pŏl'lō bĕl've-dēr':* a celebrated statue of antiquity, generally regarded as embodying the highest ideal of manly beauty. It is usually supposed to represent the 'lord of the unerring bow' in the moment of his victory over the Python, but numerous other explanations have been suggested. The figure (upwards of 7 feet in height) is naked, but a cloak fastened round the neck hangs gracefully over the extended left arm; the expression of the face is one of calm and godlike triumph, mixed with 'beautiful disdain.' This great work of art was discovered in 1503,

APOLLO DI BELVEDERE.

amid the ruins of the ancient Antium, now Capo d'Anzo, and purchased by Pope Julius II., who placed it in the Bel-

Apollo Belvedere.

vedere of the Vatican, whence the name it bears. The date of its execution is with probability referred to the reign of Nero, but the name of the artist is a matter of mere conjecture. The left hand and the right fore-arm, wanting in the statue as discovered, were restored by G. A. da Montorsoli, a pupil of Michael Angelo.

APOLLODORUS, *a-pŏl-ō-dō′rŭs:* lived abt. B.C. 408: Athenian painter, predecessor of Zeuxis. He introduced improved coloring and distribution of light and shade.

APOLLODORUS: Greek grammarian, lived about B.C. 140, studied philosophy in Athens, and grammar under Aristarchus; wrote a work on mythology, giving an arrangement of old myths from the earliest times to the historical period; also a geography, a chronicle in iambic verse, and several grammatical works. The mythology, which begins with the origin of the gods, probably went down as far as the Trojan cycle, but a portion of it has perished. It has been reckoned by some only an extract from a larger work by A., though this is mere hypothesis. An edition of the *Bibliotheca* of A. was published 1783, by Heyne, and one by Hercher 1874.

APOLLODORUS: celebrated architect in the time of the emperor Trajan, by whom he was employed to construct a bridge over the Danube in Lower Hungary. His severe censure, boldly pronounced on a design for a temple of Venus, which the emperor Hadrian had sent to him, caused A. to be sentenced to death, A.D. 129.

APOLLONIUS, *ăp-ŏl-lō′nĭ-ŭs,* surnamed Dyscolos (or ill-tempered), of Alexandria: Greek grammarian, 2d c. Some of his grammatical works were edited by Bekker. A. was the first who reduced grammar to a system. His repu-

tation was so high, that Priscian calls him *grammaticorum princeps* (prince of grammarians).

APOLLONIUS, son of Archebulus of Alexandria: lived in the time of Augustus; author of a lexicon of Homeric words.

APOLLONIUS, surnamed Molon: teacher of rhetoric at Rhodes, and also gave lectures at Rome, where he was highly esteemed by Cicero and Cæsar.

APOLLONIUS OF PERGA: B.C. 240; is classed with Euclid, Archimedes, and Diophantus, as one of the founders of the mathematical sciences. His work on conic sections has been preserved, partly in the original Greek, partly in an Arabic translation.

APOLLONIUS OF RHODES (or of Alexandria, say some authorities): b. B.C. 235; wrote many works on grammar, and an epic poem, entitled the *Argonautica*, marked rather by learning and industry than by poetical genius, though it contains some truly artistic passages, such as those exhibiting the growth of Medea's love. It was greatly admired by the Romans, was translated into Latin by Publius Terentius Varro, and was imitated, not only in a wholesale manner by Valerius Flaccus, but even by Virgil in some passages. It has been edited by the German scholars Brunck and Wellauer (1813–28), and by Keil (1853–54).

APOLLONIUS, OF TY'ANA, in Cappadocia: lived in the time of Christ; a zealous follower of the doctrines of Pythagoras. He soon collected a considerable number of disciples, travelled through a great part of Asia Minor, and endeavored to find his way to India, in order to become acquainted with the doctrine of the Brahmins. On this journey he stayed for a time in Babylon, was introduced to the Magi, and at last reached the court of King Phraortes, in India, who recommended him to Jarchas, the principal Brahmin. When A. returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity, rather than the power of working miracles. From Rome he was expelled on a charge of having raised a young woman from the dead. After extensive travels in Spain, Italy, Greece, and Ethiopia, he was accused of having taken part in an insurrection against Domitian; but appeared before the tribunal, and was acquitted. Ultimately, he appears to have settled in Ephesus, where he opened a Pythagorean school, and continued his teaching until he died, nearly one hundred years old. His history was written about a hundred years after his death by Philostratus (q.v.). It contains a mass of absurdities and fables, through which an outline of historical facts and the real character of the man are sufficiently discernible. Hierocles, a heathen statesman and opponent of Christianity, wrote, in the 3d c., a work on the life and doctrines of A., with a view to prove their superiority to the doctrine of Christ. In modern times, the notorious English freethinker Blount, and Voltaire in France, have renewed the attempt.

APOLLONIUS OF TYRE: hero of a Greek romance, which enjoyed great popularity in the middle ages, and was translated into almost all the languages of Western Europe. In it are related the romantic adventures which befell A., a Syrian prince, previous to his marriage with the daughter of King Alcistrates, of Cyrene. To these are added the adventures of his wife, who was parted from him by apparent death, as well as those of his daughter, Tarsia, who was carried off by pirates, and sold in Mitylene. The poem closes with the reunion of the whole family. The original Greek work no longer exists; but there are three very early Latin versions, of which one was published by Welser (Augsburg, 1595); another is to be found in the *Gesta Romanorum;* and the third in the *Pantheon* of Gottfried of Viterbo. From this Latin source have proceeded the Spanish version of the 13th c., printed in Sanchez' *Colleccion de Poesias Castellanas* (2d edition, Paris, 1842), several French versions, in prose and verse, as well as several Italian. As early as the 11th c. there was an Anglo-Saxon adaptation of the work, and subsequently various English ones appeared. Shakespeare has treated the subject in his drama of *Pericles;* he substantially follows Gower, in his *Confessio Amantis*, who bases his narrative on the *Pantheon* of Gottfried of Viterbo. Three popular English stories, drawn from a French version of this romance, appeared in London, 1510, 1576, and 1607; while the Dutch, 1493, derived theirs from the German. The romance was rendered into German, probably from the *Gesta Romanorum*, by a certain 'Heinrich von der Neuenstadt' (i.e., Vienna), about 1300, in the form of a long, and as yet unpublished poem. Later we have a *Histori des Küniges Appolonii*, translated from Gottfried of Viterbo; first published at Augsburg, 1476. Simrock, in his *Sources of Shakespeare*, narrates the story as it is given in the *Gesta Romanorum*. A modern Greek translation of the Latin romance, undertaken in 1500 by Gabriel Contianus, of Crete, and several times reprinted at Venice, must not be confounded with the lost Greek original.

APOLLYON, n. *ă pŏl'ĭŏn* or *yŏn* [Gr. *apol'luō*, I destroy]: a name used in the Revelation of St. John to designate the destroying angel of the bottomless pit.

APOLOGUE, n. *ăp'ŏ-lōg* [F. *apologue*—from Gr. *apolō-gŏs*, a fable]: a fable, parable, or short story, intended to serve as a pleasant vehicle of some moral doctrine. One of the oldest and best apologues or parables is that by Jotham, Judges, ix. 7–15. Another celebrated A. is that of the 'Limbs and the Body,' related by the patrician Menenius Agrippa. Æsop's fables are apologues that have a world-wide reputation. Luther held such an opinion of the value of the A. as a vehicle of moral truth, that he edited a revised Æsop, especially for young people, for which he wrote a characteristic preface.

APOLOGY, n. *ă-pŏl'ō-jĭ*, APOLOGIES, plu. *-ō-jĭz* [Gr. *apolog'ĭă*, apology—from *apo*, from; *logos*, speech: F. *apologie*, apology]: a speech in defense or excuse: an excuse; a defense. APOLOGETIC, a. *ă-pŏl'ō-jĕt'ĭk*, or APOL'OGET'-

ICAL, a. *-jĕt′ĭ-kăl*, excusing; defending by words. APOL′OGET′ICALLY, ad. *-lĭ*. APOLOGETICS, n. plu. *ă-pŏl′ō-jĕt′ĭks*, that branch of theology which defends the Scriptures, and sets forth the evidence of their divine authority. APOLOGIST, n. *ă-pŏl′ō-jĭst*, or APOL′OGIZ′ER, n. *-jīz′ĕr*, one who makes an apology, or writes in defense of another. APOLOGIZE, v. *ă-pŏl′ō-jīz′*, to make an excuse for; to speak in defense of. APOL′OGIZ′ING, imp. APOL′OGIZED′, *pp. -jīzd′*.—SYN. of 'apology': defense; justification; exculpation; excuse; plea.

APOL′OGY: the term is now commonly understood as synonymous with an excuse for defect, mistake, misdeed, breach of an engagement, etc., but was originally used as the title of any work written in defense of certain doctrines, as in the *A. of Socrates*, ascribed to Plato and Xenophon; the *A. for the Christians*, by Tertullian, and in many other defenses of the Christians, written by Justin Martyr, Athenagoras, Tatian, Theophilus, Origen, Eusebius, Minucius Felix, Arnobius, Lactantius, Augustine, Orosius, and others. The A. in some cases became rather a polemic. The attacks parried or retorted in these apologetical works are such as charges of atheism, want of philosophical knowledge, anti-social tenets, etc. Both the charges and the refutations brought forward serve to give us an insight into the character of the times when these works were written. Thus, in the A. by Tertullian, it is curious to find a formal argument employed to refute the assertion that the spread of Christianity was the cause of 'earthquakes' and other natural phenomena which had occurred in some parts of the Roman empire. After the 4th c., when the church was made dominant under the Roman emperors, apologetical writings were less called for; but Bartholus Edessenus and Raymundus Martinus wrote against the Jews and the Mohammedans. In the 15th c., when the revival of learning placed Christianity in apparent opposition to the Platonic philosophy, Marsilius Ficinus wrote in defense of revelation; and some time after the Reformation, the spread of freethinking, and skepticism in England was opposed by a variety of apologetical works, chiefly maintaining the points that Christianity is a divine revelation, Christ a divine messenger, and his church a divine institution. The defense of Christianity on grounds of reason came now to be treated as a distinct branch of theology, under the name of *Apologetics*. Among the numerous apologetic works by Protestants, are those by Grotius (*De Veritate*, etc.), Butler (*Analogy of Religion, Natural and Revealed*), Lardner (*Credibility of the Gospel History*), Leland, Addison, Soame Jenyns (*Internal Evidences of the Christian Religion*), Hugh Farmer, Bishop Watson (*A. for Christianity*), Paley (*Evidences of Christianity*, and *Horæ Paulinæ*), Chalmers, the Bampton Lectures (q.v.), etc. Among the Rom. Cath. writers, the most eminent are Pascal, Houtteville, Guenée, Bergier, Mayr, and Chateaubriand.

APOMORPHINE. n. *ăp′ŏ-mŏr′fĭn* [Gr. *apo*, from; Eng.

morphine]: a valuable and powerful emetic obtained from morphine by heating with hydrochloric acid.

APON: see AMBOYNA.

APONEUROSIS, n. *ăp-ŏn′ū-rō′sĭs*, APON′EURO′SES, plu. *-rō′sēz* [Gr. *aponeuro′sis*, the end of a muscle—from *apo*, from; *neuron*, a nerve, a muscle]: the extremity of a muscle where it becomes a tendon; the fibrous sheath of a muscle, or investment of a part. The term usually denotes expansions from the tendons of muscles, as the lumbar A. If a tendon is very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered with a tendinous expansion, to which some of their fibres are attached; this is termed the aponeurotic *origin* of the muscle; it gives the muscle a more extensive attachment. See FASCIA.

APOPETALOUS, a. *ăp′ō-pĕt′ă-lŭs* [Gr. *apo*, from; *pĕtălon*, a petal]: in *bot.*, applied to corollas whose petals are perfectly distinct and disconnected; the opposite of *gamopetalous*.

APOPHTHEGM or APOTHEGM, n. *ăp′ō-thĕm*: see APOTHEGM.

APOPHYLLOUS, a. *ă-pŏf′ĭl-ŭs* [Gr. *apo*, from; *phullon*, a leaf]: in *bot.*, applied to perianths whose parts are distinct and separate.

APOPHYSIS, n. *ă-pŏf′ĭ-sĭs* [Gr. *apo*, from; *phuo*, I grow]; in *anat.*, a process or protuberance on the surface of a bone; in *bot.*, any irregular swelling on the surface; a tubercle at the base of the seed vessel of certain mosses.

APOPLEXY, n. *ăp′ō-plĕk-sĭ* [Gr. *apoplex′ĭă*, stupor—from *apo*, from; *plesso*, I strike]: a disease or an affection of the brain that causes stupor; a fit in which all sensation and power of movement are suspended. APOPLECTIC, a. *ăp′ō-plĕk′tĭk*, or AP′OPLEC′TICAL, *-tĭ-kăl*, pertaining to the disease of apoplexy. APOPLEX, n. *ăp′ō-plĕks*, for APOPLEXY.

APOPLEXY: an engorgement of blood, with or without extravasation, in or upon any organ, as the brain (*cerebral* A.), the spinal cord (*spinal* A.), or lungs (*pulmonary* A.). As popularly used, the term denotes vaguely a condition arising from some disturbance within the head. A. may occur suddenly or come on by degrees. It is characterized by loss of sense and motion, speechlessness, heavy sleep, with stertorous respiration, and a slow pulse. The attack may last from a few hours to two or three days, and then pass off, leaving generally more or less paralysis; it may recur at intervals of months or years, or the patient may die in the first attack. The *age* at which A. most commonly occurs is from fifty to seventy. The symptoms of cerebral A. may arise from mere congestion of the brain, caused by impeded return of the venous blood. Stout persons, with short necks, are more liable to this form of A.; though lean persons are also frequently its victims. But in addition to congestion, there may be an escape of

the watery portion of the blood from the congested vessels, and this collecting, produces, *serous* A.; or there may be a plugging of one of the small arteries of the brain (embolism); or finally there may be a rupture of some of the bloodvessels in the brain, and A. from cerebral hemorrhage be the result; the latter is the most common. If this bleeding be to any great extent, death results; if only a small quantity escape, it coagulates, and forms a clot, which is absorbed in time. The attack may be preceded by vertigo, headache, partial or temporary loss of memory, and occasionally double vision. When these warnings occur, medical advice should be sought to avert the stroke if possible by relieving the oppressed brain. Sometimes the attack comes on suddenly without warning, the patient perhaps having been feeling particularly well and in good spirits up to the moment of the stroke. During an attack the person is unconscious, with flushed face, a strong, full, and moderately slow pulse, and noisy respiration. When a stroke occurs the patient's head should be raised and cold, in the form of clothes wrung out of cold water or of an icebag, should be applied to the head, the arms and legs being enveloped in cloths wrung out of hot mustard water. In some cases blood is withdrawn from the temporal artery or external jugular vein, but bloodletting is less frequently practised now than formerly. As soon as possible, purgative medicines should be administered. For the results of A. see PARALYSIS.

APOSEPALOUS, a. *ăp′ō-sĕp′ăl-ŭs* [Gr. *apo*, from, and *sepalous*]: in *bot.*, consisting of distinct and separate sepals or calyx leaves.

APOSIOPESIS, n. *ă-pŏs′ĭ-ō-pē′sĭs* [Gr. and L. *apos′iō-pēsis*—from Gr. *apo*, from; *sĭōpa′ō*, I am silent]: a rhetorical device by which, for emphasis, modesty, or any other effect, a speaker abruptly breaks off.

APOSTASIS, n. *ă-pŏs′tă-sĭs* [Gr. *apŏstăsis*, distance from an interval—from *apo*, from; *stăsis*, a standing]: in *bot.*, the separation of the whorls of leaves, or floral coverings, by an unusual length of the internodes.

APOSTASY, n., or APOSTACY, n. *ă-pŏs′tă-sĭ* [L. and Gr. *apostăs′ĭă*, a standing off from—from *apo*, from; *stasis*, a placing, a standing]: a departure from a former profession or belief. APOSTATE, n., *ă-pŏs′tāt*, one who forsakes his former principles or party—usually in a bad sense: ADJ. false; traitorous. AP′OSTAT′ICAL, a. *-tăt′ĭ-kăl*, after the manner of an apostate. APOSTATIZE, v. *ă-pŏs′tă-tīz*, to forsake a former profession or belief. APOS′TATIZ′ING, imp. APOS′TATIZED, pp. *-tīzd*.

APOSTATE, *ă-pŏs′tāt:* applied especially to one who changes his religion, and, by custom, always in a condemnatory sense, as equivalent to renegade, or one who changes his creed from unworthy motives. In early Christian times, the word was applied to those who abandoned their faith in order to escape from persecution; but it was applied also to

such as rejected Christianity on speculative grounds (the emperor Julian, for instance). After the 5th c., when heathenism was declining, many who had no sincere belief in Christianity, yet made profession of it, and were baptized: these also were styled apostates. The apostates in times of persecution were styled variously Sacrificati, Thurificati, etc., according to the modes in which they publicly made known their return to heathenism, by offering sacrifices or incense to the gods of Rome. The Rom. Cath. Church at one period imposed severe penalties on apostasy. The A. was of course excommunicated; sometimes also his property was confiscated, and he himself banished, or even put to death. It has often been of great moment to the fortunes of a nation that a prince has apostatized. The most renowned instance in modern history is that of Henry IV. of France. The term Apostasy is now employed commonly, and often abusively, as a reproach for great or sudden changes in political opinions.

APOSTEME, n. *ăp'ŏs-tēm* [OF. *apostume*—from L. and Gr. *apŏstē'ma*, an abscess]: a swelling filled with purulent matter; an abscess: the incorrect spellings, Imposthume and Impostume, are commonly used.

APOSTERIORI, a. *ā'pŏs-tē'rĭ-ōr'ī* [L. *a*, from; *postĕrĭŏr*, after latter]: arguments in reasoning drawn from consequence, effects, or results. See A Priori.

APOSTILL or Apostil, n. *ă-pŏs'tĭl* [F. *apostille*, a postscript—from mid. L. *a*, to; *postilla*, notes added to references: the abbreviation of L. *post illa verba auctōrĭs*, after those words of the writer]: a marginal note on a letter or other written document; a postcript.

APOSTLE, n. *ă-pŏs'sl* [Gr. *apŏstŏlos*, one sent out or forth—from *apo*, away; *stello*, I send]: one sent out by another; a person sent to perform important business; one of the apostles, the immediate followers of Christ. Apos'tleship, n. the office or dignity of an apostle. Apostolic, a. *ăp'ŏs-tŏl'ĭk*, or Ap'ostol'ical, a. *-ĭ-kăl*, relating to the apostles or to the office of an apostle. Ap'ostol'ically, ad. *-lĭ*. Ap'ostol'icalness, n. Apostolate, n. *ă-pŏs'tō-lāt*, a mission, the dignity or office of an apostle. Apostolicity, n. *ă-pŏs'tō-lĭs'ĭ-tĭ*, the state or quality of being apostolical. Apostolic Fathers, the early Christian writers, generally of the first century—commonly restricted to Polycarp, Clement, Ignatius, Hermas, and Barnabas. Apostolic See, a title applied to the government of the pope of Rome in reference to his claim of being the successor of St. Peter. See Apostolic Sucession: etc.

APOSTLE: any messenger whatever, but especially used to denote the twelve disciples whom Jesus sent forth to preach the gospel. Their names were Simon Peter, Andrew, John (the son of Zebedee), James (his brother), Philip. Bartholomew (called also Nathaniel), Thomas, Matthew (sur-

named Levi), James (the son of Alphæus), Thaddeus, Simon, and Judas Iscariot. Subsequently, Matthias was chosen in the room of Judas; and at a still later period, the number of the apostles was further increased by the calling of Paul to the apostleship. The term is sometimes used in the New Testament in its more general signification; thus Barnabas is styled an A. (Acts xiv.). It is a point of controversy between the supporters and opponents of episcopacy, whether or not the term A., as indicating an office, is applied to any except the original twelve, Matthias, and Paul; it being maintained, on the one hand, that the office is perpetuated in bishops; on the other, that it was temporary and belonged exclusively to those who were witnesses to the resurrection of Christ, and were employed by him to found the Christian Church. The apostles were twice commissioned by their Master to go forth on their work of evangelization. First, during the third year of his public ministry. On this occasion, their labors were to be restricted to the Jews, properly so called. Not even the Samaritans, though natives of Palestine, were to be the objects of their religious solicitude. They were earnestly to seek out the lost sheep of the house of Israel. The second time was shortly before the Lord's ascension, when their sphere of labor was indefinitely extended: 'Go ye therefore, and make disciples of all the nations, baptizing them in the name of the Father and of the Son and of the Holy Ghost' (Matt. xxviii. 19, 20). On the day of Pentecost, the apostles received miraculous gifts fitting them for their arduous work. And after evangelizing for some years in Palestine, they all departed, with the exception of James, into various quarters of the globe; but the region of their ministry seems to have principally comprised the civilized provinces and cities of the eastern part of the Roman empire—viz., Syria, Asia Minor, and Greece; though probably Peter, and after him Paul, visited Rome. There is no historical foundation for the tradition that the first apostles divided the then known world into twelve parts, each taking one of these for his special sphere of labor. This figment was very likely originated by two circumstances: 1. That the disciples were commanded to go into all the world and preach the gospel; and 2. That the disciples in point of fact had little personal intercourse with each other. Their zeal for the propagation of Christianity left them no time to gratify their social inclinations. As a consequence, we have very imperfect accounts of their lives or manner of death.

The several apostles are usually represented in mediæval pictures with special badges or attributes: St. Peter, with the keys; St. Paul, with a sword; St. Andrew, with a cross; St. James the Less, with a fuller's pole; St. John, with a cup and a winged serpent flying out of it; St. Bartholomew, with a knife; St. Philip, with a long staff, whose upper end is formed into a cross; St. Thomas, with a lance; St. Matthew, with a hatchet: St. Matthias, with a battle-axe; St. James the Greater, with a pilgrim's staff and a gourd-bottle; St. Simon, with a saw; and St. Jude, with a club.

APOSTLES' CREED: see CREED.

APOSTOLIC, or APOSTOLICAL: general term applied to everything derived directly from, or bearing the character of the apostles. Either case constitutes apostolicity. The Rom. Cath. Church declares itself the A. Church; the papal chair the A. chair, on the ground of an unbroken series of Roman bishops, from the chief apostle, Peter. The Church of England, in virtue of regular episcopal ordination from the pre-reformation church, claims to be A.; so likewise do the Protestant Episcopal Churches in Scotland and the United States. Apostolic Tradition (see TRADITION) claims to have been handed down from the apostles. In the same special sense, the name of A. Council belongs to that conclave of the apostles at Jerusalem (Acts xv.), about 51 or 52, occasioned by the disputes raised at Antioch by Judaizing Christians as to the admission of uncircumcised Gentiles into the church. Certain congregations or churches, also, which were the special scenes of the labors of the apostles, bore for centuries the title of A. Churches, more especially those of Jerusalem, Antioch, Ephesus, Corinth, and Rome. But with the ever-increasing spiritual power of the Roman hierarchy, the name A. came to be more and more exclusively applied to Rome, and is retained by her, despite the energetic protests of the Protestant Churches. Hence the term Apostolic See, i.e., the see of Rome; Apostolic Blessing, the blessing of the pope as the successor of St. Peter; Apostolic Vicar, the cardinal who represents the pope in extraordinary missions; Apostolic Chamber, a council intrusted with the care of the revenues of the see of Rome; Apostolic Months—January, March, May, July, September, November—the months in which the pope, according to the Vienna Concordat of 1448, took possession of the vacant benefices in Germany, etc. A papal brief or letter is styled A. in the same sense.

APOSTOLIC BRETHREN, or APOSTOLICI: the name given in Italy, towards the end of the 13th c., to one of those sects which, animated by the spirit of an Arnold of Brescia, felt constrained to oppose the worldly tendencies of the church. Its founder was Gerardo Segarelli, a weaver in Parma. Rejected, from some cause or other, by the Franciscan order, his long-continued and enthusiastic meditations led him to the profound conviction that it was above all things necessary to return to the simple forms of apostolic life. Accordingly, he went about (1260) in the garb of the apostles, as a preacher of repentance, and by his practical discourses gathered many adherents into a kind of free society, bound by no oaths. At first he managed to avoid any direct collision with the dogmas of the church; but after twenty years of undisturbed activity and growing influence, Segarelli was arrested by the Bp. of Parma; and in 1286, upon the occasion of his release, Pope Honorius IV. renewed a decree of Pope Gregory X. against all religious communities not directly sanctioned by the papal chair. In 1290, Nicholas IV. setting himself expressly to oppose the A. B., they, on their side, began avowedly to denounce the papacy, and its corrupt and worldly church, as the Babylon of the Apocalypse. In 1300, many, both men and women, and

among them Segarelli, as having, after abjuration, relapsed into heresy, perished at the stake. But his cause survived him. Dolcino, a more energetic and cultivated man, brought up as a priest, who had previously been active in the Tyrol against the corruptions of the church, now headed the orphan sect in Italy. He taught the duty of a complete renunciation of all worldly ties, of property and settled abode, etc. Having retreated into Dalmatia, he announced thence the dawning of a new era, and in 1304, reappeared in Upper Italy, with thousands of adherents, as the enemy of the papacy—at that time humbled and impoverished by France. In 1305, a crusade was preached against him. He fortified the mountain Zebello, in the diocese of Vercelli, but was, after a gallant defense, compelled by famine to submit. After horrible tortures, which he bore with the utmost fortitude, he was burned. In Lombardy and the s. of France, remnants of the A. B. lingered on till 1368.

APOSTOLIC CANONS AND CONSTITUTIONS: both ascribed by tradition to Clemens Romanus; notes of ecclesiastical customs held to be apostolical, written in the form of apostolic precepts. The *Constitutiones Apostolicæ*, eight books, were composed probably in Syria, and contain, in the first six books, a comprehensive rule for the whole of Christian life. These were probably written about the end of the 3d c.; but the seventh book, essentially an abridgment of them, may have belonged to the beginning of the 4th c. The eighth book was put together in the middle of the 4th c., for the use of the priests, and relates only to the sacred offices. Interpolations, however, were afterwards introduced. The *Canones Apostolici*, also recognized by the church, were composed later. The first fifty, compiled in the middle of the 5th c., and translated from Greek into Latin by Dionysius the Younger, were acknowledged by the Latin Church alone. The Greek Church, on the other hand, accepted the thirty-five canons put forth in the beginning of the 6th c.; and this became a point of discord between the churches. Both collections were probably looked upon at first as apostolic traditions merely. Later, it came to be believed that they were written down by the apostles themselves, it being thought probable that they should have expressed themselves positively about the constitution as well as the dogmas of the church.

APOSTOLIC CATHOLICS: see IRVINGITES.

APOSTOLIC FATHERS: the immediate disciples and fellow-laborers of the apostles; and in a more restricted sense, those among them who have left writings. The A. F., specially so called, are Barnabas, Clement of Rome, Ignatius of Antioch, and Polycarp of Smyrna. It is uncertain whether Papias of Hierapolis, and the author of the *Shepherd*, were really disciples of the apostles. The writings of the A. F., as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them in spirit. Their main purpose is to exhort

to faith and holiness before Christ's coming again. The best edition of the writings of the A. F. is that prepared by Dr. Lightfoot, with English translations.

APOSTOLIC MAJESTY: a title held by the kings of Hungary, conferred by Pope Sylvester II., A.D. 1000, upon Duke Stephen of Hungary, who had not only much encouraged the progress of Christianity in Hungary, but actually preached himself, in imitation of the apostles. In 1758, the title was renewed by Pope Clement XIII., in favor of Maria Theresa as queen of Hungary, and continues to be used by the emperor of Austria as king of Hungary.

APOSTOLIC PARTY: a party conspicuous in the modern history of Spain; composed of fanatical Catholics, who were also absolutists so far as the king consented to be their instrument. They formed themselves (soon after the revolution of 1819) into the A.P., whose leaders were fugitive priests, and whose troops were smugglers and robbers. After being active in all the subsequent agitations, they finally merged (1830) in the Carlist party.

APOSTOLIC SUCCESSION: common phrase used to denote one or both of *two* things—the derivation of holy orders by an unbroken chain of transmission from the apostles, and the succession of a ministry so ordained to the powers and privileges of the apostles. The former is necessarily a matter of fact, to be ascertained by history; the latter is rather a matter of opinion—the Roman and Protestant Churches, and again individuals and parties in either, differing widely from each other in their views. See BISHOP: ORDINATION.

APOSTROPHE, n. *ă-pŏs'trŏ-fē* [Gr. *apostrŏphē*, a turning away—from *apo*, away; *strepho*, I turn—*lit.*, a turning away from the subject]: a sudden breaking off a subject, and addressing a present, an absent, or an imaginary being; a mark (') put in a word to show the omission of a letter or letters, or merely as the sign of the possessive case in nouns. APOSTROPHIC, a. *ăp'ŏ-strŏf'ĭk*, pertaining to an apostrophe. AP'OSTROPH'ICALLY, ad. *-lĭ*. APOSTROPHIZE, v. *ă-pŏs'trŏ-fīz*, while speaking, to turn aside and address formally any one present or absent. APOS'TROPHIZ'ING, imp. APOS'TROPHIZED, pp. *-fīzd*.

APOSTROPHE, in Rhetoric: a figure by which a speaker, changing the course of his speech, addresses, with greater or less emotional emphasis, persons present or absent, the dead, or inanimate objects, either to invoke them as witnesses, or to pity, honor, praise, or blame them. When the figure is well managed, it has a thrilling effect, both in oratory and poetry; but when extravagantly introduced, it becomes ludicrous. Examples of it abound in the writings and speeches of the great poets and statesmen both of ancient and modern times.—A. in Grammar, is the omission of a letter or letters in a word, the omission being marked by a comma, as *'tis* for *it is;* the comma so employed is also called an *A*.

APOTHECARY, n. *a-pŏth′ē-kār-ĭ*, [L. *apothēca*, a storehouse: Gr. *apothēkē*, a store or keeping-place—from *apo*, from; *thēkē*, a box or chest]: person trained in pharmacy, who prepares and sells drugs and medicines (see CHEMISTS AND DRUGGISTS): formerly, in England and Ireland, one of the members of a lower branch of the medical profession, licensed not only to sell drugs and medicines, but also to practice the healing art. In the U. S. the term is used as a synonym for druggist or pharmacist.

APOTHE′CIA: see LICHENS.

APOTHECIUM, n. *ăp′ŏ-thē′shĭ-ŭm* [Gr. *apothēkē*, a store—from *apo*, from; *thēkē*, a box or chest]: in *bot.*, a cluster or case of spore-cells in lichens, frequently cup-shaped.

APOTHEGM, n. *ăp′ō-thĕm* [Gr. *apŏphthĕg′ma*, a thing uttered—from *apo*, from; *phthĕgma*, a word]: a thing uttered; a sententious saying; a pithy, instructive remark: the oracles of the heathen gods often took this form, as also the proverbs, memorable sayings, etc., of the sages of antiquity. Lord Bacon made a charming collection of apothegms. APOTHEGMATIC, a. *ăp′ō-thĕg-măt′ĭk*, or AP′OTHEGMAT′ICAL, a. *-ĭ-kăl*, after the manner of an apothegm. AP′OTHEG′MATIST, n. one who utters short maxims, or a maker of them. The old spelling is APOPHTHEGM.

APOTHEOSIS, n. *ăp′ŏ-thē′ō-sĭs* [L. and Gr. *apŏtheōsis*, a deification—from *apo*, from; *theos*, God—*lit.*, from a man to a god]: in ancient Greece and Rome, the ceremony of placing an illustrious man among their gods; a deification, or the raising of a mortal to the rank of a god. From the polytheistic point of view there is nothing monstrous in this idea; on the contrary, it is quite natural, and a necessary part of the system. Among heathen generally, especially among the Romans, every departed spirit became a deity (see MANES); 'and as it was common for children to worship (privately) the manes of their fathers, so was it natural for divine honors to be *publicly* paid to a deceased emperor, who was regarded as the parent of his country.' (See SMITH'S *Dictionary of Greek and Roman Antiquities*.) At the *Consecratio*, as it was called, of a Roman emperor, the body was burned on a funeral pile, and as the fire ascended, an eagle was let loose to mount into the sky, carrying, as was believed, the soul of the emperor from earth to heaven. Many medals are found with the word *consecratio* surrounding an altar, with fire on it, and an eagle rising in the air.

APOTHESIS, n. *ă-pŏth′ĕ-sĭs* [Gr. *apothĕsis*, a putting back or away—from *apo*, from; *thesis*, a putting or placing]: in primitive churches, a place on the south side of the chancel fitted with shelves for books, vestments, etc.

APOTREPSIS, n. *ăp-ŏ-trĕp′sĭs* [Gr. *apotrepsis*, aversion]: in *med.*, the resolution, or absorption, of an inflammatory tumor.

APOTROPY, n. *a-pŏt′rō-pĭ* [L. *apotropæ*—from Gr. *apo-*

tropaios, averting evil]: in *Greek poetry*, a verse or hymn designed to avert the wrath of incensed deities. The divinity chiefly invoked on such occasions was Apollo.

APOZEM, n. *ăp′ŏ-zĕm* [L. *apozema:* Gr. *apozema*—from *apozein*, to extract by boiling—from *apo*, from; *zein*, to boil]: a decoction; an extraction of the substance of plants by boiling them and preserving the infusion. APOZEMICAL, a. *ăp′ŏ-zĕm′ĭk-ăl*, pertaining to, or resembling an apozem.

APPAL or APPALL, v. *ăp-pawl′* [W. *pallu*, to fail; *pall*, loss of energy (see PALL 2): usually referred to L. *ad*, at; *pallĕō*, I become pale]: to lose the vital powers through sudden terror; to fill with dismay. APPALL′ING, imp. APPALLED′, pp. *-pawld*. APPALL′MENT, n. state of being filled with dismay. APPALL′INGLY, ad. *-lĭ*. OLD APPALL′ED WIGHT, in *OE.*, a man who has lost his vigor through age. *Note.—Appall* is simply *ap* and *pall*, 'to cause to pall,' 'to stupefy with horror,' and ought not to be confused with *pale*, from *palleo;* OF. *je appalys;* compare It. *abbaglĭārĕ*, to dazzle or hurt the sight by excessive light.—SYN. of 'appal': to dismay; daunt; terrify; frighten; scare.

APPALACHEE BAY, *ăp-pă-lăch′ē:* a portion of the Gulf of Mexico on the Florida coast, lat. 30° n.; long. 84° 15′ w. Its breadth is abt. 90 m., and it extends 50 m. inland. St. Mark's and several smaller rivers flow into it.

APPALACHEES: Choctaw tribe of Indians in Florida, on Appalachee Bay. At first friendly to the Spaniards, they afterwards revolted against the oppressions of the whites, and a number of hostile outbreaks occurred. They ceased to be a tribe of importance after 1722, and finally merged with the Creeks.

APPALACHIAN CLUB, *ăp′pa-lā′chĭ-an:* organization similar to the Alpine clubs of Europe (see ALPINE CLUB), originating in Boston about 1876, and having its principal field of labor in the great Appalachian mountain range. The objects sought are systematic exploration of the principal mountains, formation of new paths, placing of guide boards, and the preservation of their woodlands and historic sites for the use of the public. Discoveries and observations in geology, botany, zoölogy, and other sciences, are reported; and the club publishes a journal under the title *Appalachia.*

APPALACHIANS, *ăp′pa-lā′chĭ-anz:* general appellation of the great mountain-system—called also the Alleghanies—which stretches from the interior of Maine to the borders of Alabama, its distance from the sea gradually ranging between about 100 m. in the n. and about 300 in the s. Generally this chain may be regarded as the parent of the Atlantic rivers of the United States on the one side, and on the other of the s. tributaries of the St. Lawrence, and of the e. feeders of the Mississippi: it is not, however, the actual watershed during its entire length, for it is crossed by the Connecticut, the Hudson, and the Delaware, as the

Himalayas are pierced by the Ganges, and the Andes by the Amazon. The chain, in fact, consists of several ranges generally parallel to each other, which, with the intermediate valleys that occupy two-thirds of the breadth, form a belt 100 m. wide—its multiform character, however, developing itself only to the w. and s. of the Hudson. The following are the chief ridges, beginning from the n.: the White Mountains (or Hills) of New Hampshire present some of the loftiest elevations, Moose Hillock and Washington being respectively 4,636 and 6,233 ft. above the sea. Next, the Green Mountains, which, true to the name, almost cover Vermont, attain, in Killington Peak, a height of 3,924 ft.; then come the Highlands, on the e. of the Hudson, so striking an object to the voyagers on its waters; immediately beyond that river we find the Catskill Mountains, which, though of inconsiderable length, contain two eminences—Round Top and High Peak—respectively of 3,804 and 3,718 ft.; The Kittatinnies extend from the n. of New Jersey as far as Virginia; while nearer the sea the Blue Ridge, stretching from about the same parallel down to North Carolina, is crowned, within the limits of Virginia, by the Peaks of Otter, 4,000 ft. high. In North Carolina are the Black Mountains, with the highest summit of the system, Black Dome, 6,760 ft.; Mt. Mitchell, 6,711 ft.; Guyot's Peak, 6,636, Sandoz Knob, 6,612; in all about a dozen peaks now known to be higher than Mt. Washington. Lastly, there lie, more to the w., the Alleghanies proper in Pennsylvania and Virginia, and the Cumberland Mountains on the e. border of Kentucky and Tennessee.

Of all these elevations not one at all approaches the limit of perpetual snow. Yet France, while struggling with England in North America, regarded the A. as a wall that was physically to exclude her rival from the basins of the St. Lawrence and the Mississippi. Virtually the supposed barrier has been levelled from end to end. Through Maine, New Hampshire, and Vermont runs a railway from Portland to Canada; by canal or by railways, even by both abreast, New York has reached the waters of the St. Lawrence on at least four principal points between Montreal in the e. and Buffalo in the w.; Pennsylvania has carried to Pittsburg a railway of 248 m. from Harrisburg, and a canal of 312 m. from Columbia; while, with the necessary exception of little Delaware alone, each of the remaining states along the coast has its iron-way through the Appalachians.

The chain abounds in coal and iron; and it is a curious instance of the adaptation of the two worlds to each other, that, while the Spaniard met in the s. the gigantic counterparts of the central plateau of his own romantic land, the Englishman in the n. stumbled, as it were, on those same elements of almost creative energy which, within two centuries, were to be instrumental in placing the daughter with the mother among the foremost nations of the earth. As an evidence of the actual value of the coal and iron of the A.,

Pennsylvania—where, hitherto, they have been chiefly found—has since 1840 made more rapid strides in population than any other state in the Union, till between 1860 and 1870, when Illinois and other n.w. states increased more rapidly. Nor are iron and coal the only valuable products of the A.: the mountains yield abundance of limestone, marble, slate, building stone, copper, zinc, chrome, etc.

Geology.—During the Azoic and Palæozoic periods, the district now occupied by the A. was a plain. These mountains date their origin subsequent to the Carboniferous epoch. The coal measures are the newest upturned beds associated with the Appalachian range; and as the stratified rocks, with few exceptions, are laid down horizontally, these strata must owe their inclined position to the dislocating agency which elevated the mountains; they, consequently, supply a date anterior to its activity. At the base of the A., on their e. side, there are a series of red sandstone beds, unconformable to the upturned strata, and occupying the valleys in their horizontality, thus evidently unaffected by the disrupting agency which must have been active prior to their deposition. These beds have been referred by geologists to different ages. That they are Old Red Sandstone, as conjectured by Maclure and others, is now universally denied. Hitchcock's supposition that they were Permian is also considered as referring them to too remote a geological age. W. B. Rogers considered them first as members of the Triassic period; but has since, from evidence adduced from the contained organic remains, shown reason for relating them to the beginning of the Jurassic period. We thus obtain two grand limiting dates—the Carboniferous and Jurassic periods—within which the A. must have been formed. There are grounds for being even more specific, and referring the period of the dislocating agency to that immediately subsequent to the Carboniferous, represented in the stratified rocks of other districts by the Permian series; for the older upturned rocks had not only been ruptured and plicated, but also denuded into the various shapes that they now present, before the horizontal rocks were deposited.

The aggregate thickness of the Palæozoic, measured in Pennsylvania, amounts to 35,000 ft. While exhibiting a remarkable variety of mineral character, they may be classed under the three great divisions of sedimentary rocks, viz., sandstones, slates, and limestones. Intercalated with them, as subordinate layers, there occur deposits of coal, chert, and iron ore. They are all more or less fossiliferous.

Coal Measures.—The character of the rocks of the Appalachian district of N. Amer. indicates that during the Carboniferous epoch, a slow subsidence was in progress, the trough filling with the materials for sandstone and shale, afterward raised. There seem to have been vast, interior, marshy levels of such character as to be able to support the vegetation which has become, in the course of

ages, converted into coal. The coal-fields to the far w. of the A., in Michigan, Indiana, Illinois, and Missouri, have been connected with the Appalachian coal formation, which includes all the detached basins, both anthracitic and semi-bituminous, of the mountain chain of Pennsylvania, Maryland, and Virginia, and also the vast bituminous trough lying to the n.w. in Pennsylvania, Ohio, Virginia, Kentucky, Tennessee, and Alabama.

On the e. slope of the A., the coal, from its proximity to the region of greatest disturbance, has lost nearly all its volatile constituents, and is converted into hard shining anthracite (q.v.). In the troughs to the w. of the great Appalachian valley, where the forces that distributed the crust were not so intense, the coal has not parted with such a large proportion of volatile matter, but still is so much altered as to be characterized as semi-anthracite. Both the anthracite and semi-anthracite are extensively mined for economical purposes, but their extent as well as their value is of little importance compared with the enormous Appalachian bituminous coal-field. From northern Pennsylvania to middle Alabama, its length is about 875 m., and its greatest breadth between southern Pennsylvania and northern Ohio is about 180 m.; its area is abt. 56,000 sq. m., almost the largest expanse of coal measures in the world. A single coal-seam in this field has been traced over an extent of country 225 m. long by 100 broad, showing a superficial area of 14,000 sq. m.

Metals.—Extensive beds of magnetic, hematitic, and fossiliferous iron ores occur in many of the formations of the A., from the lowest metamorphic gneiss to the highest coal-measures. Iron ore is extensively wrought in Pennsylvania and Ohio, large quantities of the anthracite being used in the smelting furnaces. Veins of lead occur in the Metamorphic rocks, rarely stretching up into the red slate. In the Palæozoic beds, veins of copper and nickel occur in sufficient quantity to be wrought.

APPANAGE, *ăp′păn-āj* [F. *apanage*, an appanage—from OF. *apaner*, to nourish: mid. L. *appanā′gĭum*, any pension or alimentation—from *ad*, to; *panis*, bread]: an allowance for bread and other victuals; lands set aside for the maintenance of younger sons of a prince; sustenance. A. is a technical term in French law, signifying the assignment or conveyance by the crown of lands and feudal rights to the princes of the royal family, for their maintenance according to their rank. The word occurs in Scotch law-books, probably derived from the French. It is not a term in English law, though used in common parlance to denote any extra territorial jurisdiction or sovereignty by governments.

APPARATUS, n. *ăp′pă-rā′tŭs* [L. *apparātus*, tools or implements—from *ad*, to or for; *parātus* prepared]: things prepared as means to any certain end; a set of instruments, tools, utensils, or mechanical arrangements to be used for a particular purpose, a set of organs uniting for a common function.

APPAREL, n. *ăp-păr′ĕl* [F. *appareil*, outfit: S. p. *aparejar*, to fit, to suit: L. *ad*, for: mid. L. *parĭc′ulus*, a dim. of L. *par*, equal, like; hence F. *pareil*, alike—*lit.*, that which is fitted like to like]: clothing; dress: V. to dress; to clothe; to adorn. APPARELLING, imp. *ăp-păr′ĕl-ĭng*. APPARELLED, pp. *ăp-păr′ĕld*.—SYN. of 'apparel, n.': dress; clothing; vesture; garments; attire; array; costume; habit; clothes; vestment; raiment; uniform.

APPARENT, *ăp-pā′rĕnt* [see APPEAR]: a term employed by mathematicians and astronomers to denote things as they appear to the eye in distinction from what they really are. Thus they speak of apparent motion, magnitude, distance, height, time, etc. So important is this difference between reality and appearance, particularly in regard to the heavenly bodies, that we find all early astronomers, who were ignorant of this fact, running continually into error; and a great advancement in science was required before mankind was able to establish systems opposed to appearances. Every one knows that a body may appear to move while it is, in fact, at rest, and the motion is in the spectator, or the place on which he stands, as is the case with the sun in relation to the inhabitants of this earth. The apparent altitude of a heavenly body is what appears to be its angle of elevation above a horizon which may itself be apparent—that is, the seeming junction of sea and sky; or 'sensible'—that is, a plane passing through the point of observation at right angles to the plumb-line; or true—that is, a plane parallel to the 'sensible' horizon and passing through the centre of the earth. When the altitude of a heavenly body is measured corrections are made for refraction, parallax, and, if the measurement is from a visible sea horizon, for the height of the observer above the water.

The phrase heir apparent signifies one whose right of inheritance is indefeasible provided he survive his ancestor; as the eldest son or his issue, who must, by the course of the common law, be heirs to the father. Heirs presumptive are those who, if the ancestor should die immediately, would in the existing state of things be his heirs.

APPARITION, *ăp′pă-rĭsh′ŭn* [see APPEAR]: it is well to distinguish the use of the term as referring to the popular belief—fairly universal in time and distribution—in the appearance of forms (usually of human forms) as actually portentous and connected with the revisiting of their earthly haunts by the spirits of the departed; and again the description and accounting of such subjective appearances as hallucinations due to a diseased or excited brain. The first topic belongs mainly to the science of Folk-Lore (q.v.) and to the study of popular superstitions as well as of the anthropological distribution of such beliefs, all this field representing the diverse conceptions formed by mankind on their way to a rational conception of the material forces of the world (see ANIMISM). It must however be noted that a group of students

of such and related phenomena (especially since the activity of the Society of Psychical Research in 1882) are inclined, by virtue of the intrinsic character of the evidence, to regard a selected type of apparitions as indicating an actual transference of thought apart from the recognized channels of sense (see TELEPATHY), or as indicating the return of disembodied spirits. In no sense may it be maintained that such an interpretation is warranted by the opinion of the great majority of scientific men.

The occasional and sporadic, yet normal, experience of apparitions, apart from their common occurrence in disease and mental disorder, is well established. It is then interpreted as the expression of a slight but obscure fluctuation of brain-state and becomes a variety of hallucination. In the delirium of fevers and notably in states resultant from the excessive or even slight use of the intoxicants and mental poisons, such subjective appearances play a commanding part. Their consideration in this sense is best taken up under Hallucinations (q.v.)

APPEAL, v. *ăp-pēl′* [L. *appello*, I accuse, I call upon: F. *appeler*, to call; OF. *apeler*, to invoke, to call upon—from *ad*, *pello*, I drive]: to call to or invoke; to apply for justice; to refer a disputed matter to another, as to a higher judge or court, or to a superior; recourse; resort; in *OE.*, to accuse; to charge with crime: N. the removing of a cause from a lower to a higher court; a reference to another; an address to the judgment or feelings of an audience; an application for justice. APPEAL′ING, imp. APPEALED, pp. *ăp-pēld′*. APPEALABLE, a. *ăp-pēl′a-bl*, that may or can be appealed. APPELLANT, n. *ăp-pĕl′lănt*, the person who appeals. APPEAL′ER, n. one who. APPELLATE, a. *ăp-pĕl′-lāt*, or, APPEL′LATOR′Y, a. *-tėr′ĭ*, relating to appeals. APPELLATION, n. *ăp′pĕl-lā′shŭn*, a name: the word by which a thing is known. APPEL′LATIVE, a. *-tĭv*, pertaining to a common name. N. a common name as distinguished from a proper name. APPEL′LATIVE′LY, ad. *-tĭv′lĭ*. APPELLEE, n. *ăp′pĕl-lē*, the defendant in an appeal; one tried for a crime at the instance of another—now obsolete. APPELLOR, n. *ăp-pĕl′lŏr*, one who appeals.—SYN. of 'appellation': title; name; description; denomination; designation.

APPEAL, in Law: the right or process of bringing under the notice of a higher court the judgment of a lower court which the appellant represents as erroneous in fact or law. Formerly this right was a valuable guarantee against political oppression and private extortion: for example the A. to royal judges from courts of feudal barons. Now, the object of A. is to secure uniformity in the administration of justice. This is effected not merely by the reversal of erroneous judgments which are appealed, but by the knowledge which every judge has of precedents in the Supreme Court, and that his own judgments are subject to A. The most important questions connected with the modern system of A. are : 1. Whether in all cases, of whatever pecuniary value, A. is allowed, and also whether at all stages or only after final judgment; 2. On what conditions

as regards time, *interim* execution, and security for costs, A. is allowed; 3. The relative constitution of the lower and higher courts.

In the civil law, the earliest form of A. was the *provocatio* from the judgment of a criminal court to the Roman people. This fell into disuse under the *Quæstiones Perpetuæ*. The *apellatio* was a veto or interdict granted upon the *intercessio* of one complaining of a judicial act. The subordination of judges increased largely under the empire, and for some time the emperor, who was tribune for life and also proconsul, was the only final court of A. Latterly, the senate and the prætorian prefects also gave final decisions. Only six months were given for A. from the most distant provinces. The law is stated in detail in the Digest, Lib. XLIX.

In the Christian Church, under the judicial system defined in the False Decretals, frivolous appeals direct to the Roman Consistory multiplied enormously. The remonstrances of St. Bernard were gradually given efficiency by the Lateran and Basel councils, and wholesome restrictions on the right of A., and in favor of the independence of Cisalpine church courts, passed into most modern concordats (Fleury, *Inst. du Droit Eccles.*, iv. 23; Lancelot, *Inst. du Droit Canon.*, iii. 17). The famous *appel comme d'abus* in France was originally an A. to civil justice against the encroachments of church jurisdiction. It is evident that the question of A. is closely connected with the great problems of political history—national independence, the relations of central and provincial authorities, etc.

In English law, prior to the Judicature Acts, 1873-75, the word A. was not commonly used. In common law courts, there was a proceeding in 'error' by 'assignment of errors' and 'joinder of errors;' in chancery the A. was formerly called 're-hearing.' Under the modern system of 'jusion,' every judgment in the High Court of Justice (except the judgment of the Court of Probate where leave is required) may by simple motion be submitted to the Court of A., to have it reversed, discharged or varied. In the Chancery Division, the judge has the discretion of directing the matter to be argued before him in court, or allowing A. direct to the Court of A. The A. from the London Bankruptcy Court is also to the Court of A. An A. in divorce requires in many cases to be to the 'full court,' not to the ordinary Court of A. This last court consists practically of six Lords Justices of A., sitting in two divisions; one for common law A.; the other for chancery, probate, admiralty, and bankruptcy appeals. As regards A. from the inferior courts in England, an A. lies from the county court to a divisional court of the High Court of Justice, if the judgment has been pronounced in the ordinary or admiralty jurisdiction of the county court, but to the London Bankruptcy Court, if the judgment has been pronounced in the bankruptcy jurisdiction of the county court.

In American Law, A. is the removal of a cause from a

court of inferior to one of superior jurisdiction, in order to obtain a review of the proceedings and a re-trial. While a writ of errors carries to the higher court only matter of law for re-examination, an appeal subjects both the law and the facts to review and re-trial, the whole case being examined and tried, precisely as if it had not been tried before. While an appeal is pending, no action can be taken on the judgment of the inferior court, or until after the final decision of the cause. An appeal from a district court to a circuit court of the United States must be taken within one year. An appeal may be taken from the State courts to the supreme court of the United States, in cases involving the validity of a treaty or statute of, or authorized under, the United States; on the ground of repugnance to the Constitution, etc. For the state courts, the rules for appeals differ widely in different states.

APPEAR, v. *ăp-pēr′* [L. *ap′parērĕ*, to come in sight—from *ad*, to; *parĕō*, I am seen, I appear: F. *apparoir*]: to be visible; to come in sight; to seem; to present one's self. APPEAR′ING, imp. APPEARED, pp. *ăp-pērd′*. APPEARANCE, n. *ăp-pēr-ăns*, a coming in sight; the thing seen; the look of a person or thing; show or exhibition of one's self; pretense; show. APPEAR′ER, n. the person that appears. APPARENT, a. *ăp-pā′rĕnt*, that may be easily seen; obvious; plain; in *science*, not real—as *apparent motion*. APPA′RENTLY, ad. *-lĭ*, manifestly; clearly; openly; seemingly. APPARITION, n. *ăp′pă-rĭsh′ŭn*, a ghost; a spectre; a supposed visible spirit. APPARITOR, n. *ăp-păr′ĭ-tėr*, the attending officer of an ecclesiastical court; a summoner.—SYN. of 'appearance': air, aspect; figure; mien; manner; semblance; look; pretense; arrival; coming;—of 'apparent': clear; visible; manifest; obvious; plain; conspicuous; evident; distinct; certain; notorious;—of 'apparition': ghost; spectre; phantom; vision; phantasm.

APPEASE, v. *ăp-pēz′* [F. *apaiser*, to appease—from L. *ad*, *pacem*, peace]: to put into a state of peace; to quiet; to pacify. APPEAS′ING, imp. APPEASED, pp. *ăp′pēzd′*. APPEAS′ER, n. one who. APPEASE′MENT, n. state of being appeased or in peace. APPEASABLE, a. *ăp-pē′zā-bl*, that may be appeased. APPEAS′ABLENESS, n. the quality of being appeasable. APPEAS′IVE, a. *-zĭv*, quieting. APPEAS′IVELY, ad. *-lĭ*.—SYN. of 'appease': to alleviate; pacify; mitigate; soothe; assuage; allay; relieve; quiet; conciliate; propitiate; compose; calm; hush; cool; tranquillize.

APPEND, v. *ăp-pĕnd′* [F. *appendre*, to hang up—from L. *appendĕrĕ*, to hang to—from *ad*, to; *pendĕō*, I hang]: to attach or hang to; to add to. APPEND′ING, imp. APPEND′ED, pp. APPENDAGE, n. *ăp-pĕn′dāj*, or APPEN′DANT, n. something added to without being essentially necessary. APPEN′DANT, a. belonging to; attached. APPENDICLE, n. *ăp-pĕn′dĭ-kl*, a small appendage. APPENDIX, n. *ăp-pĕn′dĭks;* APPEN′DIXES, n. plu. *-dĭks-ĕz*, or APPEN′DICES, n. plu. *-dĭ-sēz* [L. *appendix*]: something appended or added, as at the end of a book: a supplement. APPEN-

DICULATE, a. *ăp′pĕn-dĭk′ūl-āt* [L. *appendic′ulă*, a small appendage]: in *bot.*, having a little appendage, as the scaly appendages of corollas, or found at the base of certain filaments.—SYN. of 'append': to add; annex;—of 'appendage': addition; adjunct; concomitant.

APPENDICITIS, n. *ăp-pĕn-dĭ-sī′tĭs* [L. from *appendix*]: inflammation of the vermiform appendix (see APPENDIX VERMIFORMIS). The cause of appendicitis is unknown—the most plausible explanation that can be given for the frequency of its occurrence is the one first suggested by Bernays. It is as follows: That the appendix is a rudimentary organ is certain. That it is of no use to the organism, and as a mere remnant of a once useful and well nourished organ, phylogenetically speaking, which is now in the process of being evoluted out of existence, it is a *locus minoris resistentiæ*, is also self-evident. That rudimentary organs of this kind are easily attacked by pathogenic bacteria, and readily succumb to their poisonous action because of their reduced vitality or power of resistance, seems the most scientific explanation that can be given for the occurrence of the very common disease we call appendicitis.

Definition.—Appendicitis is an inflammation of the vermiform appendix which is usually accompanied by a peritonitis of the immediately adjoining parts of the peritoneum. The real cause must be sought and is found in the intestinal bacteria, particularly in the colon bacillus or in a mixed infection of colon, bacilli, strepto- and staphylococci. Some other forms of bacilli or cocci are also found in rare cases. Foreign bodies as causative agents were formerly much talked about, but their importance was over-estimated. The usual causes given by the laity, such as errors in diet, catching cold, eating fruits, local bruises, etc., can not be absolutely discarded as nonsense, but have no real etiological significance. There has never been an opportunity to study the condition of the appendix before the first attack, and what is told about these stages of appendicitis (sometimes called chronic appendicitis) was written up in a library and is not the result of laboratory investigation. We have actual knowledge of the condition of the appendix after attacks or between attacks as the case may be. That simple catarrhal inflammation of the appendix may occur cannot be doubted, although our knowledge of this condition depends upon very few actual observations. This condition rarely leads to such symptoms as will make an operation seem to be indicated. From this mildest form of appendicitis we have all stages up to complete gangrene of the organ. The most common form which leads to operation and to autoptical observation is the form which we call perforative appendicitis. Autoptical observation is the most valuable as it permits us to study the disease in the living patient and by this method surgeons have now arrived at a clearer understanding of the process than was possible by the old method of autopsical observation which showed us only

the terminal stages of the disease upon the dead body. The very different and interesting pathological changes observed in appendicitis must be looked up in a special work on pathological anatomy. Let us not forget that the appendix is the seat of all known pathological processes. Besides cancer, tuberculosis and all the common forms of disease, actinomycosis, sarcomatosis and rare forms of tumors have been described as occurring in this organ. Diagnosis of appendicitis is usually easy and can be made by any physician who is only fairly educated. The symptoms are usually well marked in acute cases and even in chronic or interval cases cannot easily be mistaken. Before the attack we often find a history of short colicky attacks, which have passed away almost unnoticed. The access of a serious attack of appendicitis is usually very sudden and occurs in the midst of perfect health. Often while at work or at school the patient is taken with a severe bellyache soon followed by nausea and vomiting. The pain is said by the patient to be either in the ileocæcal region, in the stomach or in the umbilical region, and often pretty well over the whole abdomen. The belly becomes distended and is painful to digital pressure most exquisitely in what is known as McBurney's point. There is usually a rise of the temperature and rapidity of pulse accompanies the more dangerous cases. Both temperature and pulse depend largely on the degree of septic infection more particularly on the extent of the peritonitis which has followed the perforation. In cases in which the infection is limited to a circumscribed area and is not progressive a cure takes place by natural processes, most usually under the expectant treatment without operation. This takes place in about 75 per cent. of all attacks of appendicitis,—not in 75 per cent. of all cases. Many patients pass through numerous attacks. In spite of these figures every attack of appendicitis must be regarded as most serious and all classification is rather of evil, because we know not what moment a mild case may change into a severe or complicated one. We never can gauge the virulence of the infection with any degree of certainty at any stage of the disease, hence the prognosis of every case must be given as grave or doubtful in the beginning of the attack. A positive and definite cure of the case cannot be said to exist as long as the patient carries the appendix in his abdomen.

Treatment.—Prophylaxis against the disease there is none. All that we can do in this direction is to teach the laity to look upon so-called attacks of indigestion and colic with suspicion and to quickly call a surgeon, because the greatest safety is guaranteed by prompt and early removal of the offending organ. Operations done after the first day are followed by a high mortality. The idea of having the appendix removed from all children as a matter of prophylaxis may some day become real, but at present seems to be a pious wish, although it must be admitted to be entirely rational. It can truthfully

be said that the removal of the appendix, while it is healthy and while the health of the patient is good, is an operation entirely devoid of danger in the hands of an expert surgeon. The treatment and cure of appendicitis are safe and sure when the operation of appendictomy is done promptly, say during the first 24 or 30 hours of the attack, under ideal surroundings in a hospital and by an expert operator.

If for any reason the operation is not done early in the attack the physician will have to decide whether an operation or the expectant plan of treatment of the case is to be undertaken. We know that about 25 per cent. of all cases is lost when the prompt or early operation is not done on the first day. We also know that from 75 to 80 per cent. recover under the expectant plan of treatment. This treatment extends over weeks and months in many cases and often is complicated by all the dangers of blood poisoning, the formation of abscesses, etc., and the patient, even if recovery takes place, will go through a siege of continued fever and may be left very weak and even a confined invalid. It goes without saying that all of these dangers can be avoided only by the operation being done early in the attack.

The expectant or medical treatment of appendicitis requires much patience and all the good nursing that can be brought to bear on the case, as well as most careful nutrition. It virtually resolves itself into the treatment of a case of peritonitis. There has been much discussion of this subject and at present there are two methods of treatment radically opposed to each other in vogue. The one is the old starvation and opium method and the other the method of free purgation with liquid diet. In both methods the rectal alimentation plays a large part. The two methods have many warm advocates among physicians and there are sharp discussions going on which have not as yet led to an agreement. It will take years of careful observation in large general hospitals, upon which statistical tables of results can be based, to finally decide which method is the best to be followed.

If a patient recovers from an attack after a long or short siege of illness, unfortunately he cannot be said to be safe from further attacks, and not until the distorted and impaired remnant or defective appendix has been removed can we be sure that no other attack will come on. It is therefore well recognized that the proper thing to do is to operate on all cases of this kind after recovery from an attack, and this operation is known as the interval operation. It is much safer than the operation during the acute attack. Its mortality in expert hands is about $\frac{1}{2}$ of one per cent., and although it is often a difficult operation it may be safely recommended to all who have passed through an attack of appendicitis.

It is now the consensus of the medical profession that the operation of appendictomy early in the attack is the best treatment. If this best time has been passed, then

often the operation during the interval is safest—the patient having been nursed through his acute attack under an expectant plan of treatment.

APPENDIX VERMIFORMIS, *ăp-pĕn'dĭks vėr-mĭ-fōrm'ĭs* [L. *appendix*, appendage; *vermiformis*, worm-shaped]: in *anat.*, the vermiform appendix, a blind, worm-shaped process given off from the cæcum (q.v.): in man it is of about the calibre of a goose-quill, and 3–6 in. long. Its functions are unknown. It is sometimes the seat of very dangerous inflammation: see APPENDICITIS.

APPENZELL, *âp-pĕnt-sĕl'* [from *Abbatis Cella*]: canton in the n.e. of Switzerland; 162 sq. m. Divided into two districts—Innerrhoden and Ausserrhoden, the former of which is peopled by Rom. Catholics, the latter by Protestants, and noted for its dense population. The surface is mountainous, especially in the s., where Mount Sentis attains an elevation of 8,232 ft. The chief river is the Sitter. Flax, hemp, grain, fruit, etc., are produced, but the wealth of Inner-Rhodes, the more elevated division of the canton, lies in its numerous herds and flocks; that of Outer-Rhodes in its manufactures of muslins, gauzes, cambrics, and other cotton stuffs. Schools are numerous, and education widely diffused. The division between the Protestant and Catholic portions of the canton has existed since 1597. They have only one vote between them, and send deputies to the federal assembly in turn. Pop. (1900) 68,780.

APPERCEPTION, n. *ăp'pėr-sĕp'shŭn* [*ad*, and *perception*]: degree of perception which becomes conscious of itself (used in psychology).

Apperception is a word of at least threefold meaning in modern philosophy and psychology. For Leibnitz it designated approximately the state above designated. Ideas were arranged in degrees of clearness, the unclear were perceptions, the clear were apperceptions. In Kant the word is used in a more active sense. The transcendental unity of apperception is the highest unifying activity of mind. In Herbart we find the word first used in the sense, now most general in pedagogical circles, of the process that results from the interaction of the older experiences and the newly entering sensation. The reaction has two effects: (1), it serves to permit ideas to enter the mind that are in harmony with those already present (see ATTENTION) and (2), it amplifies and interprets the new idea in terms of the old (see PERCEPTION).

At present all three of these historical meanings are current. We find in Wundt that apperception is used as the equivalent of clearness (ideas pass through the field of perception into the point of apperception), as a name for the cause of that increase in clearness (found either in an unanalyzed force, or in the earlier experience of the individual) and also the feeling of activity that accompanies the process as a whole.

APPERT, *ap-pär*, BENJAMIN NICOLAS MARIE: b. Paris, 1797, Sep. 10: French philanthropist. He devoted himself to physical and moral reforms in prisons and hospitals, and to improvement in schools. Among his works are *Dix Ans à la Cour du Roi Louis Philippe;* and *Conférences contre le Système Cellulaire,* opposing solitary confinement.

APPERT, FRANÇOIS: b. France: inventor of a method of preserving meat, vegetables, etc., without use of salt, described in his work (Paris 1831).

APPERTAIN, v. *ăp'pėr-tān'* [mid. L. *apper'tinērĕ*—from *pertinērĕ,* to pertain to, to belong—from L. *ad,* to; *per,* through; *tenĕo,* I hold: F. *appartenir*]: to belong to as of right; to belong to; to relate to. AP'PERTAIN'ING, imp. AP'PERTAINED', pp. *-tānd'*. AP'PERTAIN'MENT, n. that which appertains to. APPERTENANCE, n. *ăp-pėr'tĕ-năns,* that which relates to another thing. APPER'TINENT, a. belonging: N. that which belongs to anything else.

APPETENT, a. *ăp'pĕ-tĕnt* [L. *ap'pĕtens* or *appĕnten'tem,* eager for—from *ad,* for; *pĕto,* I seek, I desire]: seeking eagerly for; desiring; very desirous. AP'PETENCE, n. *-tĕns,* or AP'PETEN'CY, n. *-tĕn'sĭ,* eager desire; appetite; the propensity in living creatures to select and feed upon such substances as are suited for their nourishment. APPETIBLE, a. *ăp'pĕ-tĭ-bl,* pleasing; desirable. APPETIBILITY, n. *ăp'pĕ-tĭ-bĭl'ĭ-tĭ.* APPETITE, n. *ăp'pĕ-tīt* [F. *appetit,* appetite—from L. *appetītus,* eager desire]: the natural desire or craving for food or drink; a strong desire for anything that affords pleasure. APPETITIVE, a. *ăp'pĕ-tī'-tĭv,* desiring gratification. APPETIZING, a. *ăp'pĕ-tīz'ĭng,* that creates or promotes a desire to eat, as *appetizing* food.—SYN. of 'appetite': passion; appetency; desire; a longing; a craving; eagerness; hunger.

APPETITE: see DIET: DIGESTION: FOOD AND DRINK.

APPIANI, *âp-e â'nē,* ANDREA: 1754, May 23-1817, Nov. 8; b. Milan: styled in his day 'the Painter of Graces.' His poverty compelled him to gain a subsistence by decorative painting; but in the course of his travels he studied the works of great masters, and formed for himself an original style, almost rivalling that of Correggio. At Rome, he devoted his attention to the frescoes of Raphael, and made such progress, that he soon excelled all living artists in fresco-painting. The best evidences of his genius are found in the cupola of the church of *Sta. Maria di S. Celso* at Milan; and in the frescoes with which he decorated the villa of the archduke Ferdinand in 1795. Napoleon I. appointed him court-painter. In return, he executed portraits of the French emperor and several of his generals. His most beautiful frescoes are the paintings on the ceilings of the palace of Milan, which consist of allegorical illustrations of Napoleon's career; and Apollo with the Muses in the Villa Bonaparte. Almost all the places in Italy contain frescoes by A. His finest oil-painting is Rinaldo in the garden of Armida. The fall of his patron, Napoleon I., left A. in indigence.

APPIANUS, *ăp′pĭ-ā′nŭs:* native of Alexandria, who lived during the reigns of Trajan, Hadrian, and Antoninus Pius. He was author of a Roman history, in 24 books, of which only 11 are extant. It was not remarkable for anything except the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the empire, from its rude beginning on the Palatine Hill to the period when its power held the whole world in awe, which is at once the popular and the philosophical method, he divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes, and afterwards followed the history of Sicily, Spain, Hannibal's wars, Libya, Carthage, and Numidia, Macedonia, Greece Proper and its colonies, Syria, Parthia, the Mithridatic war, the civil wars, and the imperial wars in Illyria and Arabia. As a historian, A. is a mere compiler, and not very accurate in his compilation. His geographical knowledge is singularly deficient, considering, the age in which he lived; e.g., in his section on Spain, he states that it takes only half a day to sail from Spain to Britain. The edition of A. by Schweighaüser is highly esteemed, but the most complete is that in the *Bibliothèque Grecque* of Firmin Didot.

APPIAN WAY, *ăp′pĭ-ăn* [Lat. *Via Appia*]: well named by an ancient writer *Regina Viarum* (the queen of roads); formed, in part at least, by Appius Claudius Cæcus, while he was censor, B.C. 313. It is the oldest and most celebrated of all the Roman roads. It led from the *Porta Capena* at Rome in a southerly direction to Capua, passing through Three Taverns, Appii Forum, Terracina, etc. Subsequently, it was carried on to Beneventum, Tarentum, and thence to Brundusium. It had an admirable substructure or foundation, from which all the loose soil had been carefully removed. Above this were various strata cemented with lime; and, lastly, came the pavement, consisting of large hard hexagonal blocks of stone, composed principally of basaltic lava, and jointed together with great nicety, so as to appear one smooth mass. The remains of it are still visible, especially at Terracina. The cost must have been enormous, for the natural obstructions are great. Rocks had to be cut through, valleys filled up, ravines bridged, and swamps embanked.

AP′PIUS CLAU′DIUS CRAS′SUS: a Roman decemvir (in office, B.C. 451-449). While the other decemviri were engaged in repelling an incursion made by the Sabines, A. C. and his colleague Oppius remained in Rome, with two legions to maintain their authority. Meanwhile, A. C. had been smitten by the beauty of Virginia, daughter of a respected plebeian named Lucius Virginius, who was abroad with the army. By force and stratagem, representing that she was the born slave of Marcus Claudius, one of his clients, A. C. gained possession of the maid. His design was penetrated by Icilius, who was betrothed to Virginia, and who, aided by Numitorius, her uncle, threatened to raise an in-

THE APPIAN WAY IN THE TIME OF CAESAR.

surrection against the decemviri. Virginius hurriedly recalled from the army by his friends, appeared and claimed his daughter; but, after another mock-trial, she was again adjudged to be the property of Marcus Claudius. To save his daughter from dishonor, the unhappy father seized a knife and slew her. The popular indignation excited by the case was headed by the senators Valerius and Horatius, who hated the decemvirate. The army returned to Rome with Virginius, who had carried the news to them, and the decemviri were deposed. A. C. died in prison by his own hand (as Livy states), or was strangled by order of the tribunes; his colleague, Oppius, committed suicide; and Marcus Claudius was banished. The *Claudia Gens* (see GENS) was one of the most numerous and important of the patrician tribes or clans of Rome; and besides the sons and grandsons of the decemvir, there were numerous persons of distinction who bore the name of Appius.

APPLANATE, a. *ăp'plăn-āt* [L. *ad*, to; *planātus*, made flat—from *plānus*, level, flat]: in *bot.*, flattened out; horizontally expanded.

APPLAUD, v. *ăp-plawd'* [L. *applaud'ĕrĕ*, to strike one thing upon another—from *ad*, for; *plaudo*, I make a noise by clapping the hands: F. *applaudir*]: to praise by clapping the hands or by some loud noise; to express approbation of; to commend. APPLAUD'ING, imp. APPLAUD'ED, pp. AP'PLAUD'ER, n. one who. APPLAUSE, n. approbation by shouts or clapping of hands, or in some other noisy way; the act of praising. APPLAUSIVE, a. *ăp-plaw'zĭv*, that contains applause.—SYN. of 'applaud': to praise; commend; extol; approve; magnify;—of 'applause': acclamation; acclaim; commendation; plaudit; praise.

APPLE: well known fleshy fruit of the tree *Malus malus*, Britton, (*Pyrus malus* L.) order Pomaceae. (See MALUS.) The genus Malus includes many species which are native to the Old World and three or four which are indigenous to North America. Sargent in his Manual of trees of North America recognizes four American species one of which, *M. Ioensis*, may well be regarded as but a variety of *M. coronaria*. The descriptions of the botanical features of the four American species as given below are largely accepted from Sargent.

1. *Malus angustifolia*, Michaux. The wild crabapple of the South Atlantic States ranges from Delaware, Western Pennsylvania, and Tennessee to Florida and Louisiana. Tree may reach a height of thirty feet with a trunk ten inches in diameter; head, broad, open; wood close grained, heavy; leaves convolute in bud, glabrous or nearly so when mature, thick, shining, half evergreen, not lobed, lanceolate-oblong, acute at base. Petioles slender, hard. Flowers conspicuously beautiful and fragrant, rose pink to white, clustered on slender pedicels one inch to one and one-half inches long. Calyx persistent. Fruit often not more than three-fourths inch in diameter, oblate,

green to pale yellow, hard, fragrant but ascerb, sour and almost inedible unless cooked. It is used for preserves. It ripens in winter. Not cultivated for fruit.

2. *Malus coronaria*, Mill.—The wild crab apple of the north and west. It ranges from Southern Ontario and Western New York along mountain glades to Alabama and westward into the Missouri Valley and Texas. Tree similar in habit to *angustifolia*. Leaves convolute in bud, glabrous or nearly so when mature, ovate to triangular ovate, often three lobed, truncate or sub-cordate at base, incisely serrate, glabrous to tomentulose below, bright green above, turning in autumn to yellow. Petioles long, hard, slender. Flowers beautiful, showy, large, white to rose pink, delightfully fragrant. Calyx persistent. Fruit in open clusters, distinctly oblate without dots or spots. It may reach a diameter of one and one-half inches but usually is much smaller. Calyx persistent. Skin green, or eventually yellowish, waxy, fragrant. The fruit ripens late and may keep through the winter. It is acid with more or fess ascerbity. It has long been valued for culinary use. Not cultivated for fruit except as noted under *M. Ioensis*.

3. *Malus Ioensis*, Britton.—In the Mississippi basin *M. coronaria* varies into *Ioensis* which is distinguished by Bailey as having* leaves elliptic to ovate-oblong, irregularly and obtusely serrate and at first coated with thick hoary tomentum, becoming tomentulose as also do the long stout fruit-stalks. As found in Iowa and adjacent states the fruit varies from oblong to oblate, with rather dull deep green skin often marked with light dots, and having a characteristic aroma and greasy feel.

Large fruited varieties of *Ioensis* and *coronaria* are occasionally found wild and some few have been introduced as, for example, Howard, or *Hamilton*, Mercer, or *Fluke*, Kentucky Mammoth or *Mathews*, Missouri, Pokertown, Eden, Forest King, Soulard and other sorts both named and unnamed. A wild variety recently brought to notice in Wisconsin is quite mild in flavor and has little of the acerbity natural to the species. It may be expected that eventually native varieties of superior hardiness and desirable fruit will be developed.

Certain of these introduced wildings have been described as probable hybrids between the native species and *M. malus*, or as a distinct species under the name of *M. Soulardi*, but they may well be regarded as pure *M. coronaria* or *Ioensis*. Although *M. coronaria* has been artificially hybridized with *M. malus* this has been accomplished rarely and with difficulty. Certain of the large sorts above mentioned have been taken from the wild far from cultivated areas with no known supply of *M. malus* pollen within reach; moreover the variation from the wild species in the size of their fruit is not sufficient evidence of either specific difference or of hybrid origin.

*American Garden 12:473; Evolution of Our Native Fruits, p. 256.

Bechtel double flowering crab is a horticultural variety of *M. coronaria* which is very hardy and of decided ornamental value.

4. *Malus rivularis*, Roem., (*Pyrus fusca*, Raf.) The Oregon crabapple, ranges from Northern California northward along the coast to the Aleutian Islands. In the rich valleys of Oregon and Washington the tree reaches a height of from 30 to 40 feet. Leaves conduplicate in the bud, ovate-lanceolate, serrulate, often three-lobed. Flowers rather small, white; calyx lobes eventually deciduous from the fruit. Fruit about three-fourths of an inch long, oblong, yellowish green or blushed, sometimes nearly red; ripens in autumn. Flesh thin, dry, with pleasant sub-acid flavor. Used by the Indians. No variety of this species is cultivated for its fruit.

Species Introduced from the Old World.—Several of the Old World species of *Malus* have been introduced into America. Some of these are rarely seen outside of arboretums or similar collections of trees; others, such as the flowering apples and crabapples from China and Japan, have been disseminated to a limited extent for ornamental purposes, while the apple and crabapple of commerce are commonly cultivated throughout the temperate regions of America.

5. *Malus Toringo*, Sieb. The Toringo crab of Japan, is a shrub or dwarf tree. Leaves variable, simple or lobed somewhat like those of certain Crataegus and coloring in Autumn. Flowers small, white or faintly blushed. Fruit very small clustered on long slender pedicels. Calyx deciduous.

6. *Malus floribunda*, Mich.—The Japan Flowering Crab is a desirable ornamental shrub or small tree bearing an abundance of showy rose-red flowers. Fruit very small, round, red, borne on long, slender stalks; does not persist till winter. Calyx deciduous. Leaves conduplicate in the bud, small, not lobed. This group includes the semi-double forms Halliana and Parkmani and the double form Scheideckeri.

7. *Malus spectabilis.*—Chinese flowering apple, is a tree twenty feet to thirty feet high with roundish or somewhat spreading head. Flowers large, showy, in some forms double, pale red when open, darker red in bud. Leaves oval-oblong, narrower and with more slender petioles than *M. malus*, nearly or quite smooth, as also are the pedicels and calyx tube. Calyx persistent. Fruit roundish-ovate, small. Seldom planted.

8. *Malus ringo, Wen.*—Ornamental bush or small tree from Japan. Leaves rather broad; incised. Fruit three-fourths inch in diameter or less. Calyx persistent. Flower, large, showy.

9. *Malus baccata*, Britton. (Pyrus baccata L.).—In its pure form this is readily distinguished from M. malus by its firm, smooth, bright green leaves which are borne on hard slender leaf stalks. The fruit is borne in clusters

on long slender hard pedicels. Its color may be either bright red or yellow, or a combination of both. The flesh does not get mellow even when ripe. The fruit is small, not more than $\frac{3}{8}$ to $\frac{3}{4}$ of an inch in diameter. Calyx eventually deciduous. Flowers large, usually pure white.

CRAB. SIBERIAN CRAB.—Some forms which appear to be derived from *M. baccata* have been described by botanists under *Pyrus prunifolia, Wild.* Bailey is undoubtedly correct in regarding this prunifolia group as of hybrid origin, being derived from *M. baccata* and *M. malus*. Various cultivated crab apples show indications of such hybridity in having the calyx sometimes deciduous or partly so and sometimes persistent. All gradations between *baccata* and *malus* may be found among the hybrids which usually pass under the name of crabapples or Siberian crabapples. The larger fruited ones are most commonly cultivated. Small fruited forms of *M. malus* and those of austere quality are also sometimes called crabapples. Thus among nurserymen the seedling stocks of *M. malus* which are imported from France are commonly known as French crab stocks and certain cider apples of the *M. malus* are called crabs even though the fruit be large, e.g., Dumelow crab.

10. *Malus malus*, Britton, (Pyrus malus L.).—The commonly cultivated apple is characterized by simple soft leaves; flowers short stemmed, white or partly tinged with deep rose pink, especially in bud, and borne on short pedicels in a simple umbel; calyx persistent. Fruit depressed at both ends. It sets in clusters but soon begins to drop so that it commonly ripens singly. It is borne on spurs or sometimes on slender twigs. The under side of young leaves, young twigs, buds, calyx lobes and young fruits are commonly fuzzy. This very variable species has developed several botanical varieties and innumerable horticultural varieties. Under cultivation it has become hybridized with *M. baccata* to such an extent that all gradations between the two parent species are found in the hybrids. Those which most resemble *M. malus* are commonly classed as apples, others are commonly called crabapples as stated above.

THE COMMON APPLE.—Under cultivation the apple has been distributed widely throughout the temperate zones. Its original home is not definitely known. DeCandole held that it is most indigenous to the region south of the Caucasus, from the Persian province Ghilan on the Caspian to Trebezond on the Black Sea and that from prehistoric times it has existed in Europe, both wild and cultivated, over an area extending from the Caspian Sea to the Atlantic Ocean, except in the extreme north. He cites it as being found wild in the mountains of Northwest India, but not in Japan, Mongolia or Siberia.

Under favorable conditions the apple tree grows to a height of forty feet or more and on old orchard sites

not unfrequently trees may be found still in productive condition at the age of from seventy-five to 100 years or more, while individual trees have been known to attain a much greater age. Apple wood is valuable for use in turnery and for tool handles. Also it is used to some extent for wood cuts in place of box wood. It has high fuel value and is excellent for fire place fuel.

The fruit varies greatly in different varieties from nearly globular to more or less oblong or conic or oblate forms. It also varies greatly in color, size, flavor and quality. The color may be altogether green or yellow or red, but more commonly it shows some combination of these colors. The flesh is commonly whitish or yellowish but sometimes is streaked with red. Rarely it is entirely tinged from skin to core with red or pink. The flavor ranges in different varieties from sweet to acid and in some is mingled with more or less bitterness or astringency. The different varieties cover a long period in season of edible maturity. The earliest varieties ripen in midsummer and others follow in succession through late summer, autumn, winter, spring and into early summer. The longer keeping varieties do not reach edible maturity on the tree, but ripen in storage. The condition of the fruit when stored and the manner in which it is stored have much to do with success in keeping apples in storage.

The apple was first introduced into America by the early settlers from Europe. It is recorded as being grafted on wild stocks in Virginia as early as 1647. The records of the Massachusetts Company indicate that seeds of the apples were introduced into that colony at least as early as 1630. The season of several varieties which had been fruited in Massachusetts was recorded in 1648 and some were then being propagated, for in 1648 Governor Endicott of Boston exchanged five hundred three-year old apple trees for 250 acres of land.

The Apple is now cultivated in every state in the Union. In some states it is but little grown while in others it is of very considerable domestic and commercial importance. It is the leading commercial fruit of the United States and Canada—being grown extensively for home consumption and for a large foreign trade. While the present export demand comes mostly from European countries the trans-Pacific shipments are of considerable value and are sure to increase greatly in importance with Siberia, China and other Asiatic countries and also with Australia. East of the Rocky Mountains the most important apple-growing districts are found in portions of the region which extends from Nova Scotia and the lower St. Lawrence Valley to the Virginias and westward into Southeastern Nebraska, Eastern Kansas and the Ozarks of Missouri and Arkansas. In the northern portion of this region and east of Lake Michigan the dominant commercial varieties are Baldwin Rhode Island Greening, Northern Spy; other well known sorts are Golden Russet, Roxbury Russet, Tompkins King, Maiden Blush, Hubbard-

ston, Westfield Seek-no-further, Esopus Spitzenburg, Yellow Bellflower, and Twenty Ounce.

Nova Scotia and portions of New England grow fine Gravenstein. Fameuse and others of its kin reach the highest degree of perfection in the St. Lawrence Valley. North and West of the Baldwin district where the winter climate is too rigorous for varieties of the degree of hardiness of Baldwin very hardy kinds such as Wealthy, Oldenburg, Patten Greening and various Russian sorts are successfully grown. These ripen mostly in summer or autumn but some of them may be held satisfactorily in cold storage till midwinter or later. Plant breeders are endeavoring to produce a winter apple for these regions which will have high enough market value to be desirable for commercial planting. The present indications are that this ideal may eventually be reached.

In the lower Hudson Valley and in exceptional localities in Virginia and North Carolina are produced the famous Green Newton and Yellow Newton. The latter is also known as the Albermarle. For many years these apples have commanded the highest prices paid by the export trade. These varieties are not adapted for general cultivation.

The dominant commercial varieties which are grown south of the Baldwin district are Ben Davis and York Imperial. Gano and Black Ben Davis are evidently sports of Ben Davis which they resemble closely in tree and fruit but are distinguished from it by being more highly colored. Other important sorts in the Ben Davis region are Rome Beauty, Winesap, Willow Twig, Grimes Golden, Jonathan, Missouri Pippin and Ralls Janet.

Various districts in the Rocky Mountain States are growing beautiful apples in some places with irrigation and in other places without. Here are produced Ben Davis and its kin and also Winesap, Mammoth Black Twig, Yellow Bellflower, Jonathan, Grimes and other sorts. The apples of Idaho, Oregon and Washington are receiving well merited recognition in the world's markets. The apple growers of these states are unexcelled in the thoroughness of their methods of orchard management and of grading, packing and marketing their fruit. Here the Baldwin reappears as a variety of commercial importance, although it has not gained a place for itself in all of the vast territory intervening between these states and Lake Michigan. Along with the Baldwin are also found some of its old New York and New England comrades such as Jonathan, Yellow Bellflower, Esopus Spitzenburg and Rhode Island Greening.

South of the Ben Davis district from the Gulf States westward to California the apple, except in high elevations, is of inferior texture and flavor and often the trees are short lived and unproductive.

In 1892 Bailey found 878 varieties of apples being

offered for sale by American nurserymen. The cultivated named varieties of course greatly exceeded this number because many old sorts have been propagated which are no longer grown in the nurseries and many varieties have been disseminated locally which have never been listed by nurserymen. The number of cultivated varieties gradually changes as old ones are becoming obsolete and new ones are constantly originated. New varieties are obtained from seed, but not more than one in several thousand proves superior to kinds already grown. Propagation of varieties is principally by grafting (q.v.) and budding (q.v.) on stocks grown from seed (see NURSERY). Though sometimes dwarfed, the A. is usually grown as a standard (see ORCHARD). To secure trees sufficiently hardy to endure the climate of the colder regions of the United States, varieties have been imported from Russia, but they have not proved uniformly successful. The A. needs a good soil and careful attention. To promote the growth of the tree and the production of fruit, fertilizers containing liberal quantities of phosphoric acid, potash, and lime, should be supplied. If properly cultivated, good trees from the nursery should bear a few specimens of fruit 3 years from planting, and in 10 years should yield paying crops, though some varieties are much slower than others in coming into bearing. The wood of the A. is hard, has a fine grain, and takes a handsome finish. The tree is hardy and vigorous, though the improved varieties are much less so than the natural sorts; and it lives 50 to 150 years. The Crab A. is often planted as an ornamental tree, and some of the Siberian varieties are vigorous growers, liberal bearers, and yield handsome fruit, of which many specimens are 1 to 2 in. in diameter. The fermented juice of the A. is called cider (q.v.); with age and exposure to the air it turns into vinegar (q.v.). That of the Crab A. is called verjuice. The A. is subject to various diseases, and is preyed upon by about 175 species of insects, which attack every part of the tree, and the fruit. For remedies for plant-lice, see APHIS; for various caterpillars and worms, spray with Paris green (1 lb. to 200-300 gals. of water). For methods of preventing and destroying this pest, see BORER. The scab, a fungoid disease, affects the leaves and fruit; also the leaves are affected by various forms of blight and rust. Spraying with the Bordeaux mixture seems the most efficient remedy. A vigorous condition tends to overcome the injury from attacks of disease and insects. There is quite an export trade in apples, and immense quantities are required for home consumption.

Beaufins or Biffins are apples slowly dried in ovens, and occasionally pressed till they become soft and flat. They are prepared in great quantities in Norfolk, Eng.

APPLEBERRY: see BILLARDIERA.

APPLEBY, *ăp'pl-bē*, county town of Westmoreland, Eng.: lat. 54° 35′ n., long. 5° 28′ w. It is in the n. of the

co., on the river Eden, which flows past Carlisle into the Solway Firth. A. has two parishes, one on each side of the river, which is here crossed by an old stone bridge of two arches. There is a castle in the town, the keep of which, called Cæsar's Tower, is still in moderately good condition. The lent and summer assizes are held at A. Until the passing of the Reform Bill, it returned two members to parliament. It was then disfranchised, though is still possesses a municipal corporation. Pop. about 1,800.

AP'PLE OF DISCORD: according to Greek mythology, the golden fruit thrown among the Olympian divinities by the goddess of discord (Eris), bearing the inscription 'for the fairest.' Aphrodite (Venus), Hera (Juno), and Pallas (Minerva) became competitors for it, and its award to the first by Paris so inflamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed. This story is introduced in Tennyson's *Œnone.*

AP'PLE JACK, or Apple Brandy: a liquor made from the fermented juice of apples by the ordinary processes of distillation.

AP'PLE OF SODOM: the title of a fruit described by old writers as externally of fair appearance, but turning to ashes when plucked. It is probably the fruit of *Solanum sodomeum,* a nightshade of northern Africa, which when eaten may produce delirium and even death. An American nightshade is also so called.

AP'PLE-SHELL: the designation of one of the large, handsomely ornamented, globose, bush-climbing pond-snails of tropical Africa and America, belonging to the genus *Ampullaria.* Some species are to be found along the southern border of the United States. These mollusks are truly amphibious, having both lungs and gills, and are thus able to breathe in water or in air, whenever disposed to exchange an aquatic for a terrestrial existence. Consult Semper, *Animal Life* (1881).

APPLETON, *ăp'pl-tŏn:* city and county-seat of Outagamie co., Wis., on the Fox river and on the Chicago & N. W. and the Chicago, M. & St. P. railways; 25 m. s.w. of Green Bay. The Grande Chute rapids affords immense water power and the city is at the head of navigation on Lake Winnebago and on the Green Bay waterway. The manufactures include furniture, farm implements, machinery, paper, pulp, flour, woolen and knit goods, etc. It is the seat of Appleton Collegiate Institute and Lawrence University (Methodist Episcopal). There are several banks, a university and public libraries and daily and weekly newspapers. It was settled in 1840, incorporated as a village 1853, and as a city 1857. Pop. (1910) 16,773.

1. A West Virginia Apple Orchard.
2. Apple Trees in Southern Pennsylvania.

AP'PLETON, Charles Edward Cutts Birch, an Englishman of letters: b. in Reading, England, 16 March, 1841; d. in Luxor, Egypt, 1 Feb., 1879. He was graduated from St. John's College, Oxford, in 1863, studied for two years in German universities, and was appointed lecturer in philosophy at St. John's College. His best service to literature and his time was his founding the 'Academy, a Monthly Record of Literature, Learning, Science, and Art,' whose first number appeared 9 Oct., 1869. Appleton remained editor until his death. To a volume of essays on the 'Endowment of Research' he contributed two articles: 'Economic Character of Subsidies to Education,' and 'Endowment of Research as a Form of Productive Expenditure' (1876). See J. H. Appleton and A. H. Sayce, 'Life and Literary Relics' (1881).

APPLETON, Daniel: publisher, founder of the house of D. Appleton & Co.: 1785, Dec. 10, 1849, Mar. 27; b. Haverhill, Mass. After keeping a dry goods store at Haverhill, he removed to Boston, and 1825 to New York. In the latter city, he placed his eldest son, William Henry A., in charge of a book department which he added to his dry goods line, and which it soon superseded. For a time, the business was principally confined to the importation and sale of English works, and an agency was established in London 1835. The first publication was a 32mo book entitled *Daily Crumbs from the Master's Table.* William H. A. was taken into partnership 1838, and 10 years later the father retired. The business is still conducted under the name of D. Appleton & Co., and their publications cover the entire field of literature. Medical books and Spanish books form separate departments.

APPLETON, George Swett: publisher: 1821, Aug. 11—1878, July 7; b. Andover, Mass.; son of Daniel A. After studying at Phillips Acad., in his native town, he spent four years at the Univ. of Leipzig. In 1865 he became a partner with three of his brothers in the firm of D. Appleton & Co. He developed a large trade in Spanish works, and introduced the department of illustrated books, of which the first venture was *Picturesque America,* then the finest illustrated work ever issued.

APPLETON, George Webb, an American novelist and dramatist: b. in New Jersey in 1845. He is author of the novels *Frozen Hearts; Catching a Tartar; Jack Allyn's Friends; A Terrible Legacy; The Co-Respondents; A Philanthropist at Large; The Blue Diamond Mystery; Francois, the Valet; Rash Conclusions; Romance of a Poor Girl; A Forgotten Past; The Ingenious Captain Cobbs; The Rook's Nest; The Lady in Sables; The Mysterious Miss Cass: A Fool and His Folly; Miss White of Curzon Street; The Duchess of Pontifex Gardens; A Hundred Years of French History,* 1789-1889; and of the plays *A Fair Sinner; Zana; Co-Respondents; Jack, the Handy-Man; The Unbidden Guest;* etc.

APPLETON, Jesse, d.d.: 1772, Nov. 17—1819, Nov. 12; b. New Ipswich, N. H.: educator. He graduated at Dartmouth College, taught for two years, studied theol., and became pastor of a Congl. church at Hampton, N. H., 1797. He was elected pres. of Bowdoin College 1807. He was an excellent classical scholar and an impressive preacher. A biographical sketch, with a collection of addresses, was published 1820, sermons and lectures 1822, and *The Works of Jesse Appleton, D.D.*, 2 vols., 1836.

AP'PLETON, John Howard, an American scientist: b. in Portland, Me., 3 Feb., 1844. He was graduated from Brown Univ. in 1863 and was instructor in chemistry there 1863-89,and professor since 1868. He was a member of the United States Mint Commission in 1891. His chemical text-books have been widely used, and include *Qualitative Chemical Analysis* (1878); *Quantitative Chemical Analysis* (1881); *Chemistry of the Non-Metals* (1884); *Metals of the Chemist* (1891); *The Carbon Compounds* (1892).

APPLETON, Nathan, ll.d.: 1779, Oct. 6—1861, July 14; b. New Ipswich, N. H.: merchant. He left college to enter the store of his brother, Samuel A., in Boston, with whom he soon formed a partnership. He was interested in the cotton factory at Waltham, in which power-looms were first used in this country; was one of the founders of the city of Lowell, a member of the state legislature for several terms, and was elected to congress 1830 and 42. He was a member of various learned societies, and very benevolent.

APPLETON, Samuel: 1766, June 22—1853, July 12; b. New Ipwich, N. H.: merchant. He worked on a farm, taught school, kept a store in his native town, removed to Boston 1794, and engaged in importing, and soon formed a partnership with his brother Nathan A. He also became interested in cotton manufacturing at Waltham and Lowell, and accumulated great wealth. He often distributed his entire annual income in charity.

APPLETON, Thomas Gold, an American author and artist: b. in Boston, Mass., 1812, March 31; d. in New York city, 1884, April 17. He was graduated from Harvard Univ. in 1831 and spent much of his life abroad. His witticism, *Good Americans, When They Die, Go to Paris*, has been erroneously ascribed to O. W. Holmes and others. His books are: *A Sheaf of Papers* (1874); *Nile Journal* (1876); *Chequer Work; Tales and Essays* (1879); *Syrian Sunshine* (1877); *Windfalls* (1878). His poem *Faded Leaves* was once popular. See Susan Hale Life and Letters (1885).

APPLIABLE, APPLIANCE, etc.: see under Apply.

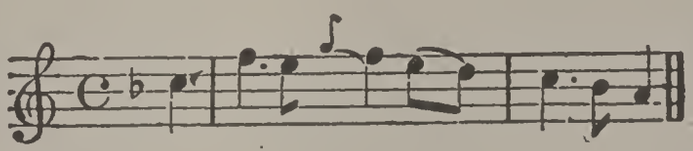
APPLICATE, n. *ăp'plĭ-kāt* [L. *applĭcātus*, joined or attached—from *ad*, to; *plĭco*, I fold]: in *geom.*, a straight line drawn across a curve so as to be bisected by the diameter, the ordinate.

APPLIQUE, a. *ăp-plēk'* [F.—from *appliquer*, to apply,

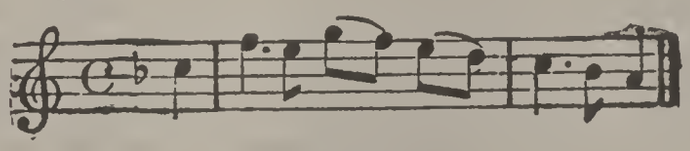
to put on]: a style of work in which one material is laid upon another, as velvet on satin or cloth.

APPLY, v. *ăp-plī′* [OF. *applier*, to apply: L. *applĭcārĕ*, to fold upon—from L. *ad*, to; *plĭco*, I fold]: to lay on; to put one thing to another; to use or employ for a particular purpose; to fix the mind with attention; to make application; to suit; to keep at work. APPLY′ING, imp. APPLIED, pp. *ăp-plīd′*: ADJ. of said a science whose laws have been reduced to rules for practical use, as *applied* chemistry, *applied* mathematics. APPLI′ER, n. one who. APPLIABLE, a. *ăp-plī′ă-bl*, that may be applied. APPLI′ABLY, ad. *blĭ*. APPLIANCE, n. *ăp-plī′ăns*, the act of applying; the thing applied; means to an end; resource. APPLICABLE, a. *ăp′-plĭ-kă-bl*, fit to be applied; suitable. AP′PLICABIL′ITY, n. *-kă-bĭl′ĭ-tĭ*, or AP′PLICABLENESS, n. *-bl-nĕs*, the quality of being applicable or fit to be applied. AP′PLICABLY, ad. *-blĭ*. APPLICANT, n. *ăp′plĭ-kănt*, one who applies; a petitioner. APPLICANCY, *ăp′plĭ-kăn-sĭ*, the state of being applicable. AP′PLICA′TION, n. *-kā′shŭn*, the act of applying; close study; great attention to, as to business; entreaty; employment of means. AP′PLICATIVE, a. *-kā-tĭv*, capable of being applied. AP′PLICATORY, a. *-kā-tėr-ĭ*, capable of being applied: N. that which applies.

APPOGGIATURA, *ăp-pŏj′ă-tô′ră* [It.]: in *music*, a grace-note: a form of embellishment by insertion of notes of passage in a melody. The A. notes are printed in a smaller character than the leading notes of the melody, and should always be given with considerable expression. When they are extemporized by a performer or singer, they serve as an indication of good or of bad taste. The time of an A. is taken from the essential note to which it belongs, as in the following example



Played.



For APPOGIA′TO, see PORTAMENTO.

APPOINT, v. *ăp-poynt′* [F. *appointer*, to refer a cause, to give wages; *appoincter*, to order, to finish a controversy—from L. *ad*, to; *punctum*, a point]: to find fitting; to settle the exact time for a transaction; to fix upon; to settle; to ordain; to furnish. APPOINT′ING, imp. APPOINT′ED, pp. APPOINT′ER, n. one who. APPOINT′ABLE, a. *-ă-bl*, that may be appointed. APPOINT′MENT, n. state of being appointed; being named for an office; act or privilege of naming for an office; established order. APPOINT′MENTS, n. plu. the accoutrements of an officer. See EQUIPMENT.

KIT: KNAPSACK. The appointments of a ship are, collectively, all her articles of equipment and furniture. APPOINTEE, n. *ăp-poyn-tē′*, one appointed.—SYN. of 'appoint': to allot; nominate; prescribe; constitute; ordain; order;—of 'appointment': designation; command; order; direction; establishment; equipment.

APPOINTMENT, in Law: in England, conveyances granted on a consideration are frequently reserved in common law; and in family settlements, certain *powers*, as they are called, such as powers of jointuring, selling, charging land with the payment of money; and the subsequent exercise of the power is called an *A.* This A.—which may be made either by deed or by will—is not considered as an independent conveyance, but is merely ancillary to the deed or instrument in which the power of A. is reserved, and from which the party in whose favor the A. is made for most purposes derives his title. The Courts of Equity give relief against a defective A., or defective execution of a power, where there is what is called a 'meritorious consideration' in the person applying for such relief.

In American chancery practice, A. is the exercise of a right to designate the person or persons who are to take the use of real estate. The A. must be made by the person authorized, who may be any person competent to dispose of an estate of his own in the same manner, including a married woman, even though her husband may be the appointee; or an infant, if the power be simply collateral. If the appointment be made 'to and amongst' several, a fair allotment must be made to each. The effect of an A. is to vest the estate in the appointee, as if conveyed by the original donor.

APPOMATTOX COURT-HOUSE, *ăp-pō-măt′toks:* small village, county-seat of Appomattox co., Va.; 80 m. w. of Richmond, about 20 m. e. of Lynchburg; 3 m. n. of Appomattox Station, on the Norfolk and Western r.r. It is famous for the surrender, by Gen. Robert E. Lee, of the Confederate army of n. Va. to Gen. Grant, 1865, April 9, practically ending the civil war.

APPONYI, *ŏp′pō-nyĭ*, GYÖRGY (GEORGE), COUNT, a Hungarian statesman: b. 1808; d. 1899. He was Hungarian court chancellor in 1847 and after some years of retirement entered the Reichsrath of Vienna in 1859 and was active in furthering schemes for the welfare of Hungary, materially assisting in bringing about the union of Austria-Hungary on the present basis. His son ALBERT APPONYI, a leading member of the Hungarian diet, is one of the most eloquent orators in Hungary.

APPORTION, v. *ăp-pōr′shŭn* [F. *apportionner;* mid. L. *appor′tĭonārī*, to distribute equitably—from L. *ad*, to; *portĭōnem*, a part]: to distribute in just portions; to give a share to; to divide; to assign. APPOR′TIONING, imp. APPOR′TIONED, pp. *-shŭnd.* APPOR′TIONMENT, n. a dividing into shares or portions. APPOR′TIONER, n. one who.—SYN. of 'apportion': to allot; appoint; destine; divide; assign; share; distribute.

APPORTIONMENT, in Law: in the United States, the allowance made in the case of an incomplete performance of a contract; the allotment of their shares in a rent to the different parties indebted; and the determining, in the case of encumbered estates, of the amount which each of the several parties interested in the estate shall pay toward the removal, or in support of the burden of the incumbrance. In relation to contracts an apportionment is the allowance, in case of the partial performance of a contract, of a proportionate part of what the party would have received as a recompense for the entire performance of the contract. But where the contract is to complete a thing for a certain sum of money or other consideration, there can be no apportionment.

APPORTIONMENT-RENT.—A term denoting the allotment of shares in a rent to each of several persons owning it. It is also applied to the determination of the amount of rent to be paid when the tenancy is terminated at some period other than one of the regular intervals for the payment of rent.

APPORTIONMENT BILLS, CONGRESSIONAL: acts of congress passed in accordance with the constitution, defining the number of representatives in congress allotted to each state—the number being assigned after each decennial census, in proportion to the total population. It is provided that the actual enumeration shall be made every ten years, that the number of representatives shall not exceed one for every 30,000, but that each state shall have at least one representative. From the organization of the govt. till 1830, the number of representatives had multiplied nearly three times; being 65 in 1789, and 240 in 1830. Till this time the allotment had increased from 1 member for every 30,000 pop. to 1 for every 47,700. In 1840 the relation was changed to 1 for every 70,680, each census increasing the ratio of divergence, until in 1900 it reached 1 for every 194,182 of pop., there being then 386 members. The rule generally followed has been based on an intention to have no more than 300 members, and the difference between this number and the actual figures has been caused mainly by accession of new states. The latest act of apportionment was approved 1901, Jan. 16, increasing the number of members by 29, the same to take effect 1903, Mar. 4. The principle applied in the case of the U. S. house of representatives is adopted in the several states in their apportionment for representation in their legislative bodies, and such apportionment usually follows the decennial period. See CONGRESS, UNITED STATES.

APPOSITE, a. *ăp′pō-zĭt* [L. *appŏsĭtus*, put or placed at or near—from *ad*, to: *posĭtus*, placed or put]: well put in respect of time, place, or circumstances; suitable; well adapted to: in *bot.*, having similar parts; similarly placed;

placed, as side by side. AP′POSITELY, ad. *-zĭt-lĭ*. AP′POSITENESS, n. fitness; suitableness. APPOSITION, n. *ăp′-pō-zĭsh′ŭn*, the act of placing beside; in *gram.*, two nouns following each other in the same case, the latter explanatory of the former, or modifying it in some way.

APPOSI′TION: a term in Grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first, as *My brother, the physician; Thomas the Rhymer.* Whole sentences or clauses admit of A.; thus, 'Napoleon sought the way to India through Russia, a stroke of genius.' Sometimes a connecting word is used where logical propriety would require A.; as, *the city of London*, for *the city London.*

APPRAISE, v. *ăp-prāz′* [F. *apprécier*, to value; mid. L. *appretĭārĕ*, to put a price upon—from L *ad*, to; *prĕtĭum*, a price]: to put a price upon; to fix the value of an article for the purpose of sale. APPRAIS′ING, imp. APPRAISED′, pp. *-prāzd′*. APPRAIS′ER, n. one whose business it is to put values on articles that are to be sold. APPRAISEMENT, n. *ăp-prāz′mĕnt*, a valuation put on an article.—SYN. of 'appraise': to appreciate; estimate; esteem; value.

APPRAISEMENT: the valuation of goods or real estate by persons appointed by competent authority and called appraisers. Such valuation is ordered by law or by the courts, in the case of property of persons dying intestate, of insolvents and of others. Where private property is taken for public use, an A. is made of it, that the owner may be paid its just value. A. is also often a matter of agreement in the private settlement of disputed questions, in purchase and sale, and in forming co-partnerships, or in making contracts for service, where property, real or personal, is a factor. In collecting the customs at ports of entry, the appraiser and his deputies are officials charged with examining goods imported and dutiable, with a view to prevent under-valuation and to prescribe the proper classification for charging the legal duty.

APPRECIATE, v. *ăp-prē′shĭ-āt* [mid. L. *appre′tĭārī*, to value at a price—from L. *ad*, *pre′tĭum*, a price: F. *apprécier:* see APPRAISE, from same root-words]: to set a proper value on; to esteem rightly; in *Amer.*, to rise in value; to raise the value of. APPRE′CIATING, imp. APPRE′CIATED, pp. APPRECIABLE, a. *ăp-prē′shĭ-ă-bl*, that may be properly valued; capable of being estimated. APPRE′CIABLY, ad. *-blĭ*. APPRECIATION, n. *ăp-prē′shĭ-ā′shŭn*, the setting a value on; a just estimate of.—SYN. of 'appreciate': to appraise; estimate; esteem; value.

APPREHEND, v. *ăp-prĕ-hĕnd′* [F. *appréhender*—from L. *apprĕhend′ĕrĕ*, to seize or take hold of—from L. *ad*, to; *prehendo*, I seize or take]: to take hold of; to seize; to understand; to think on with fear. AP′PREHEN′DING, imp. AP′PREHEN′DED, pp. AP′PREHEN′DER, n. one who. AP′PREHEN′SIBLE, a. *-sĭ-bl* [L. *apprēhensus*, seized or taken hold of]: that may be apprehended. AP′PREHEN′SION, n. *-hĕn′shŭn*, the act of taking or seizing; the being able to understand; suspicion; fear. AP′PREHEN′SIVE, a. *-sĭv*,

fearful; in expectation of evil. AP'PREHEN'SIVELY, ad. *-sĭv-lĭ.* AP'PREHEN'SIVENESS, n. the quality or state of being apprehensive.—SYN. of 'apprehend': to conceive; suppose; imagine; presume; assume; fear; dread; catch; arrest; detain; capture; understand; believe. See ARREST.

AP'PREHEN'SION [Latin *apprehensio,* from *ad+ prehendere,* to seize], a term employed to designate the act or faculty (1) of perceiving anything through the senses, (2) of forming an image in imagination, (3) of conceiving without judging, the so-called simple apprehension of nominalistic logic; or (4) a relatively simple and immediate act of intellection with or without reference to an external object. Stone makes a rather important distinction between implicit and explicit apprehension. Through frequent recognition of an object of knowledge the mind acquires the ability to distinguish and identify it as a whole without apprehending any of its constituent elements. The act which thus grasps its object without conscious combination or synthesis of parts is an implicit apprehension. If attention lingers upon the object, a tendency toward multiplicity arises, the component parts become discernible, and implicit apprehension becomes explicit. In the one there is a distinctionless unity; in the other a conscious synthesis.

Wundt distinguishes apprehension from apperception, or what we should call clear and self-conscious perception, in a very suggestive though highly figurative way. He, of course, recognizes that in a series of temporarily successive ideas or mental states the one immediately present in perception has the most favorable position as regards clearness and distinctness. Likewise, in a spatial series, or in a complex of simultaneously interconnected factors present in consciousness, some factors are more favorably located than others. There is, accordingly, a state of clearest grasp in consciousness, which, when accompanied by a special feeling, is called attention. This state of clearest grasp is figuratively styled the fixation point of consciousness, or, more briefly, the inner fixation point. In contrast the whole complex psychical content is called the field of consciousness. A conscious process which passes into an unconscious state is said to pass below the threshold of consciousness. A psychical compound which enters the field of consciousness passes on to the inner fixation point, then out again into the field, and finally descends below the threshold, is an apperceived compound. But just as such compounds may enter the field of consciousness before reaching the point of fixation, so may other compounds enter the field and pass out again without entering the fixation point at all. Such compounds are only apprehended. Thus it appears that Wundt's distinction between apprehension and apperception is simply one of relative clearness and distinctness of perception. Perceptions that are vague and unclear are called apprehensions, while those which are clear, self-conscious, and voluntary are apperceptions. Con-

sult Wundt *Outlines of Psychology* (1897); Stout, *Analytical Psychology* (1896).

APPRENTICE, n. *ăp-prĕn'tĭs* [OF. *apprentis;* F. *apprenti,* a beginner—from *apprendre,* to learn: mid. L. *apprentic'ĭŭs,* an apprentice—from L. *ad,* to; *prehendo,* I take]: one taken under a bond or indenture as a beginner or learner; a young person learning a trade or profession: V. to put under a master to learn a trade or profession. APPREN'TICING, imp. APPREN'TICED, pp. *-tĭst.* APPREN'TICESHIP, n. the service or condition of an apprentice.

APPRENTICE, one taken under bond or indenture as a beginner or learner. Apprenticeship exists at common law, but, in the United States, has been generally regulated by statute, on account of its liability to abuse. It is not binding upon an infant unless the contract be entered into by him with the consent of the parent or guardian, or by the parent or guardian with his consent, such consent to be made a part of the contract. In a common indenture of apprenticeship the father is bound for the performance of the covenants by the son. This contract must be entered into, generally, by indenture or deed, and is to continue, if the A. be a male, only during minority, and if a female, only till she arrives at the age of eighteen. The law holds that the agreement entered into is binding upon the master equally with the A.; the former stands *in loco parentis* to the latter; that he is bound to treat the A. with kindness, and not ill-use him in any way, must watch over his general conduct and afford him a good example and good advice, and must so instruct him in his trade or vocation that, if he be diligent and capable, he can thoroughly learn it—although the master is not to be held accountable for failure because of incompetency. He cannot dismiss his A. without the consent of all the parties to the indenture, even though the A. should steal his master's property, or by reason of incurable illness become incapable of service, except by the sanction of some competent tribunal. Upon the death of the master, the apprenticeship is dissolved.

APPRISE, v. *ăp-prīz'* [F. *appris,* learned, instructed—from L. *ad,* to; *prehendo,* I seize or take]: to instruct in the knowledge of a thing; to inform; to give notice of. APPRI'SING, imp. APPRISED', pp. *-prīzd'.* For APPRISING, an obsolete term in Scotch law, see ADJUDICATION.

APPROACH, v. *ăp-prōch'* [F. *approcher,* to draw near—from mid. L. *apprŏprĭārĕ,* to approach—from L. *ad,* to; *prope,* near; *propĭŭs,* nearer]: to draw near; to come up to: N. a coming or drawing near; a path or avenue. APPROACH'ES, n. plu. *-ĕz,* siege-works; means of access. APPROACH'ING, imp. APPROACHED, pp. *ăp-prōcht'.* APPROACH'ER, n. one who. APPROACH'ABLE, a. *-ă-bl,* that may be reached; accessible. APPROACH'MENT, n. the act of coming near. APPROACH'LESS, a. that cannot be come near to or approached.—SYN. of 'approach': access; admittance; approximation.

APPROACH'ES: in military language, the sunken

trenches or excavated roads constructed by besiegers. The siege camp being usually at a considerable distance from the fortress or city attacked, the soldiers would be exposed to imminent danger while hastening across a belt of open country to enter any breaches made by the large siege guns, were it not that concealed roads are first constructed along which they may approach. In some cases the A. are not actual trenches, but merely paths shielded by a piled-up wall of sand-bags, fascines, gabions, woolpacks, or cotton-bales. One of the most tremendous combinations of A. in the history of war was at the siege of Sebastopol in 1854-55; it comprised the digging of no less than 70 m. of sunken trench, and the employment of 60,000 fascines, 80,000 gabions, and 1,000,000 sand-bags, to protect the men working in the trenches and at batteries. See SAP: SIEGE.

AP'PROBATE AND REP'ROBATE: technical expression in the law of Scotland, which simply means, that no one can be permitted to A. and R.—that is, to accept and reject the same deed or instrument. It is applicable to wills, and other legal writings, deeds, or instruments; and is analagous to election (q.v.).

APPROBATION, n. etc.: see under APPROVE.

APPROPRIATE, v. *ăp-prō'prĭ-āt* [L. *appro'priātus*, made proper or peculiar to one's self—from *ad*, to; *proprĭus*, private, one's own: F. *approprier*, to appropriate]: to apply to one's own use; to set apart for a particular use; to claim or use as by right: ADJ. limited or set apart to a particular person or use; fit; suitable. APPRO'PRIATING, imp. APPRO'PRIATED, pp. APPRO'PRIATENESS, n. peculiar fitness; suitableness. APPRO'PRIATELY, ad. *-lĭ*. APPRO'PRIA'TION, n. *-shŭn*, the act of setting apart for a particular use or purpose; the setting aside of a benefice for the use of some spiritual foundation, as for a college or chapter. APPRO'PRIA'TOR, n. one who holds an appropriated benefice. APPRO'PRIABLE, a. *-ă-bl*, that may be appropriated or set apart. APPRO'PRIATIVE, a. *-prĭ-ā-tĭv*, that appropriates.—SYN. of 'appropriate, v.': to usurp; arrogate; assume; ascribe; claim; exercise; annex;—of 'appropriate, a.': peculiar; particular; suitable.

APPRO'PRIA'TION: a term denoting a specific sum set apart for the legislative power for a designated purpose. In the United States no money can be drawn from the Treasury excepting by appropriations made by law (Constitution, art. 1). Under this clause it is necessary for Congress to appropriate money for the support of the Federal government and in payment of claims against it. All bills for appropriating money originate in the House of Representatives, but may be amended in the Senate. The same procedure is observed in the several states.

APPROVE, v. *ăp-próv'* [F. *approuver*, to approve—from L. *approbārĕ*, to favor—from L. *ad*, to; *probo*, I prove or test; *prŏbus*, good]: to be pleased with as good; to pronounce sufficient; to like; to commend. APPRO'VING, imp. APPROVED', pp. *-prôvd'*. APPRO'VINGLY, ad. *-lĭ*. APPRO'VER, n. one who approves; a criminal who gives evidence against his accomplices; one who makes trial. APPROVE'MENT, n. approbation; evidence of an approver. APPROBATION, n. *ăp'prō-bā'shŭn*, the act of approving, commendation; expression of approval or satisfaction with. APPROBATIVE, a. *ăp'prō-bā'tĭv*, or APPROBATORY, a. *ăp'-prō-bā'tẽr-ĭ*, containing or implying approbation. AP'PROBA'TIVELY, ad. *-lĭ*. AP'PROBA'TIVENESS, n. in *phren.*, the love of approbation. APPROVABLE, a. *ăp-prô'vă-bl*, that merits approval. APPRO'VABLENESS, n. APPROVAL, n. *ăp-prô'văl*, approbation.—SYN. of 'approbation': approval; concurrence; consent; liking; sanction; proof;—of 'approve': to praise; applaud; commend; extol; confirm.

APPROVER, or PROVER, in the Law of England: an accomplice in the perpetration of a crime who has been admitted to give evidence against the prisoner.

In the United States the term A. is not known in law: the legal designation is ACCOMPLICE; and accomplices are admitted to give evidence for the prosecution, or, as it is said, to become *state's evidence*, upon an implied promise of pardon, on condition of their making a full and fair confession of the whole truth. The testimony of an accomplice is in all cases, however, regarded with just suspicion; and, unless his statement is corroborated in some material part by unimpeachable evidence, the jury are usually advised by the judge to acquit the prisoner; and if the accomplice, after having confessed the crime, and being admitted as state's evidence, does not satisfy the condition on which he was so received by failing to give full information without equivocation, reservation, or fraud, he then forfeits all claim to protection, and may be tried, convicted, and punished on his own confession.

APPROXIMATE, v. *ăp-prŏks'ĭ-māt* [L. *approx'ĭmātus*, brought near—from *ad*, to; *prox'ĭmus*, next, nearest]: to come near; to approach; to cause to approach. ADJ. nearest to or next; nearly approaching accuracy. APPROX'IMA'TING, imp. APPROX'IMA'TED, pp. APPROX'IMA'TION, n. *-shŭn*, a near approach; an advancing near; a continual approach nearer and nearer to a result. APPROX'IMATELY, ad. *-lĭ*, with a near approximation. APPROX'IMA'TIVE, a. *-tĭv*, that approaches closely.

APPROXIMA'TION: term in mathematical science designating such calculations as are not rigorously correct, but approach the truth near enough for a given purpose. Thus in logarithmic and trigonometrical tables nearly all the numbers are mere approximations to the truth. The calculations of astronomy generally are of this nature. Even in pure mathematics there are parts in which approaches to the truth, by means of interminable series, are all we are able

to gain. The solution of equations beyond the fourth degree can be got only by A.

APPUI, *ăp-pwē* [Fr.]: a stay or support. In military tactics, the *points d'appui* are such parts of the field of battle as are suited to give support or shelter. As the wings of an army (like the extreme sides of a chess-board) are the weakest points of resistance to attack, they especially require support or protection, and are placed, when it is possible, in localities which serve to obstruct the attacking forces. Lakes, morasses, woods, streams, and steep declivities may thu serve as *points d'appui.*

APPULEIUS, or, less properly, APULEIUS, *âp-pū-lē'yŭs:* satirical writer of the 2d c.; b. Madaura, in Africa, where his father was a magistrate, and a man of large fortune. A. studied first at Carthage, which at that time had high reputation as a school of literature. Afterwards he went to Athens, where he entered keenly upon the study of philosophy, displaying a special predilection for the Platonic school. The fortune bequeathed to him at his father's death enabled A. to travel extensively. He visited Italy, Asia, etc., and was initiated into numerous religious mysteries. The knowledge which he thus acquired of the priestly fraternities, he made abundant use of afterwards in his *Golden Ass.* His first appearance in literature arose from a lawsuit. Having married a middle-aged lady, named Pudentilla, very wealthy, but not beautiful, he drew upon himself the malice of her relations, who desired to inherit her riches, and who accused the youth of having employed magic to gain her affections. His defense (*Apologia*, still extant), spoken before Claudius Maximus, proconsul of Africa, was an eloquent and successful vindication of his conduct. After this he seems to have given zealous attention to literature and public oratory, in both of which he attained great eminence. He was so extremely popular that the senate of Carthage, and other states, erected statues in his honor.

The *Golden Ass*, the work by which his reputation has survived, is a romance or novel, whose principal personage is one *Lucian*, supposed by some, though on insufficient evidence, to be the author himself. It is generally understood to have been intended as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though Bishop Warburton, and other critics, fancy they can detect in it an indirect apology for paganism. Its merits are both great and conspicuous, as are also its faults. Wit, humor, satire, fancy, learning and even poetic eloquence abound, but the style is disfigured by excessive archaisms, and there is a frequent affectation in the metaphors, etc., which proves A. to have been somewhat artificial in his rhetoric. The most exquisite thing in the whole work is the episode of Cupid and Psyche (imitated by La Fontaine). It is supposed to be an allegory of the progress of the soul to perfection. Besides the *Apologia* and *Golden Ass*, we have from the pen of A. an Anthology in four books, a work on the Dæmon of

Socrates, one on the doctrines of Plato, one on *The Universe*, etc. A considerable number of his works are lost.

APPULSE, n. *ăp-pŭls'* [L. *appul'sus*, driven to or towards—from *ad*, to, at: *pulsus*, pushed, struck]: the act of striking against; in *astron.*, near approach of two heavenly bodies to one another; also APPUL'SION, n. *-shŭn*. APPUL'SIVE, a. *-sĭv*, striking against. APPUL'SIVELY, ad. *-sĭv-lĭ*.

APPURTENANCE, n. *ăp-pėr'tĕ-năns* [OF. *apurtenaunce;* F. *appartenance*, an appendage: mid. L. *appartenĕn'tĭă*, anything protected as one's own—from L. *ad*, to; *pertin'ĕō*, I pertain or belong]: that which belongs to something else; an adjunct; an appendage. APPUR'TENANT, a. joined to, or belonging to. See APPERTAIN.

APRAXIA, n. *ă-prăx'ĭ-ă* [Gr. *a*, without; *prassein*, do]: inability to apprehend correctly the meaning and use of objects. It is distinctly a mental disorder, not necessarily involving any sensory or muscular defects.

APRAXIN, *â-prâk'sin*, FEODOR MATVAYEVICH, Count of: 1671–1728, Nov. 10: distinguished Russian admiral. When hardly twelve years of age, he entered the service of Peter the Great, who formed a great attachment for him, which lasted during the whole life of the monarch. In 1699, he took part in the first maneuvers of the Russian fleet at Taganrog on the Sea of Azof. After 1700 he became the most powerful person at the court of the czar, who made him chief-admiral of the Russian navy, of which, in fact, A. may be considered the creator. While Peter was fighting the Swedes in the n., A. was building war-vessels, fortresses, and wharfs in the s. In 1707, he was appointed pres. of the admiralty; in 1708, he defeated the Swedish general, Lübecker, in Ingermannland, and saved the newly-built city of Petersburg from destruction; in 1710, he captured the important town of Viborg, in Finland; and in 1711, commanded in the Black Sea during the Turkish war. The following year he returned to the n.; and in 1713, with a fleet of 200 vessels, he sailed along the coast of Finland, took Helsingfors and Borgo, and defeated the Swedish fleet. The result of his great successes was, that at the peace of Nystadt, 1721, Russia obtained some most valuable advantages, being confirmed in her possession of Finland, just conquered, and of Esthonia. In spite of his brilliant reputation, however, he twice suffered an apparent eclipse of imperial favor. In 1714–15, he was charged with embezzlement, tried, and condemned to pay a fine; and a few years later was denounced by Peter himself as 'an oppressor of the people,' and again condemned to pay a fine; but his services were too useful to be dispensed with, and in both instances the czar neutralized the effect of the condemnation, by conferring upon him additional riches and dignities. In 1722, he accompanied Peter in his Persian war, and was present at the siege of Derbend. His last naval expedition was in 1726, when he repaired with the Russian fleet to Revel, to defend that place against an expected attack by

the English. He died at Moscow, in the 57th year of his age.

APRICOT, n. *ā′prĭ-kŏt* [Sp. *albaricoque*—from Ar. *albirkouk:* Pers. *barbuk*, a peach, of which L. *præcoc′ĭă* Gr. *praikŏk′ĭă*, seems to be a mere adaptation: F. *abricot*]: old spelling APRICOCK: (*Prunus Armeniaca*): a species of the same genus with the PLUM (q.v.): native of Armenia, and of the countries eastward to China and Japan; a middle-sized tree of 15-20, or even 30 ft. high, with ovate, acuminate, and cordate, smooth, doubly-toothed leaves on long-stalks; solitary, sessile, white flowers which appear before the leaves, and fruit resembling the peach, roundish, downy, yellow, and ruddy on the side next the sun, with yellow flesh. The A. was brought into Europe in the time of Alexander the Great, and since the days of the Romans has been diffused over all its western countries. It has been cultivated in England since the middle of the 16th c.; and has become one of the leading fruit products of the State of California, where it was first cultivated at the Spanish Missions. The A. is nearly as hardy as the ordinary varieties of the peach, but in order to prevent a too early starting of the buds in spring, the tree should have a n. rather than a s. exposure. The soil should be deep and rather dry; if overlying an impervious subsoil it should be underdrained. Varieties are propagated usually by budding (q.v.), though in the nursery, grafting (q.v.) is sometimes done. In warm climates A. and peach stocks are often used, but plum stocks are preferred for cold regions. The A. ripens several weeks earlier than the peach. It is particularly subject to attacks of the curculio (q.v.) There are about 20 good varieties. Apricots split up, having the stone taken out, and dried, are brought from Italy as an article of commerce, in particular from Trieste, Genoa, and Leghorn: in the s. of France, also, they are an article of export in a preserved and candied state. Dried apricots from Bokhara are sold in the towns of Russia, the kernels of which are perfectly sweet like those of the sweet almond. The kernels are sweet in some kinds, and bitter in others—the bitterness being probably more natural, and the sweetness, as in the almond, the result of cultivation. Generally speaking, the kernels may be used for the same purpose as almonds. From the bitter kernels, which contain prussic acid, the *Eau de noyaux* is distilled in France. The charred stones yield a black pigment similar to Indian ink. The wood of the tree is good only for the purposes of the turner.

The BRIANÇON A. (*Prunus Brigantiaca*), very much resembles the common A. The fruit is glabrous. It is found in Dauphiné and Piedmont. At Briançon, an oil, called *Huile de marmotte*, is expressed from the seeds.

The SIBERIAN A. (*P. Sibirica*), also is very like the common A., but smaller in all its parts. The fruit is small. It is a native of Siberia, especially of the s. slopes of the mountains of Dahuria.

APRIL, n. *ā′prĭl* [L. *aprīlis*—from *aper′ĭō*, I open: F. *œvril:* Sp. *abril:* It. *aprile*]: the fourth month of the year. The Romans named the month thus because it was the season when the buds began to open: by the Anglo-Saxons it was called Ooster or Easter-month; and by the Dutch Grassmonth. APRIL-FOOL, one deceived in some humorous and ludicrous way on the 1st of April, as being sent on an absurd errand. The custom is perhaps a travesty of the sending hither and thither of the Saviour from Annas to Caiaphas, and from Pilate to Herod, because during the middle ages this scene in Christ's life was made the subject of a miracle-play (q.v.) at Easter, which occurs in the month of A. It is possible, however, that it may be a relic of some old heathen festival. The custom, whatever its origin, appears to be universal throughout Europe. In France, one thus imposed upon is called *un poisson d'Avril* (an A. fish). In England, such a person is called an A. fool; in Scotland, a gowk. Gowk is the Scotch for the cuckoo, and also signifies a foolish person.

A PRIORI and A POSTERIORI—*ā′prī-ōr′ī* [L. *a*, from; *prior*, former]; *ā′pŏs-tē′rĭ-ōr′ī* [L. *a*, from; *posterior*, after, latter]. These contrasted forms of argument are complementary and not contradictory. A priori reasoning illustrates the controlling power of *principles* in unifying our conceptions of facts, whereas inference a posteriori exhibits the necessity of appreciating *concrete characteristics* in defining principles. Accordingly, while deductions from general truths must always be adjusted to particular circumstances, inductions from particulars must bring the individuality of facts within the unity of general principles. The mistake is made frequently of setting these forms of argument in opposition. The consequence of such fallacious procedure is that deductions based upon general principles without regard to the limitations imposed by particulars are soon seen to be arbitrary and valueless, and that inductions which exclude the leadings of general principles become meaningless aggregations of unrelated facts. The significance of the fallacy above mentioned has been embodied historically for modern philosophy in the emergence of English Empiricism (a posteriori method) and of Continental Rationalism (a priori method) alike into scepticism. Kant formulated the error clearly in his statement that 'Thoughts without content are empty, perceptions without conceptions are blind.' It was a fundamental feature of Kant's own critical procedure that he insisted upon the complementary values of a priori and a posteriori methods in developing knowledge.

APRON, n. *a′pŭrn*, or *ā′prŏn* [OF. *naperon*, a large cloth: F. *nappe*, table-cloth—from L. *mappa*, a table-napkin]: a made-up piece of cloth or leather worn in front; a covering, as of lead or zinc. A. of a cannon, a piece of sheet-lead which covers the touch-hole, tied by two pieces of white rope. A. in ship-building, a piece of curved timber fixed behind the

lower part of the stem, and just above the foremost end of the keel; its chief use is to fortify the stem, and connect it more firmly with the keel. The name A. is given also to the plank-flooring raised at the entrance of a dock, a little higher than the bottom, to form an abutment against which the gates may shut. APRONED, a. *ā'prŭnd,* wearing an apron. A'PRON-MAN, n. a man who wears an apron; a workman.

APROPOS, ad. *ăp'rō-pō'* [F. *à-propos*]: to the purpose; seasonably.

APSE, n. *ăps,* or APSIS (q.v.) *ăp'sĭs;* APSIDES, n. plu. *ăp'sĭ-dēz*: semicircular recess at the east end of the choir, or chancel, in Romanesque or what are often called Anglo-Saxon or Anglo-Norman churches; a dome-roofed recess in a building; the arched roof of a room. The curious origin of this peculiar termination to the choir of a church has been clearly established by recent German writers. It is well known that the heathen structure from which the early Christians borrowed the form of their churches was not the temple, but the basilica or public hall which served at once for a market-place and a court of justice. The basilica, for the most part, was a parallelogram, at one of the shorter sides of which, opposite to the entrance, there was a raised platform destined for the accommodation of persons engaged in and connected with the distribution of justice. This portion of the building was the prototype of the rounded choir, to which the name of A. was given, and which is still to be

Church at Schwartz, Rheindorf.

seen in many of the Rhenish churches. For the pretor's chair, which was placed in the centre of this semicircular

space, the altar was substituted; and the steps which led to the seat from which he dispensed justice were destined henceforth to lead to the spot where the Fountain of all justice should be worshipped. Many A.'s are to be met with in English churches. On the continent the structure is still more frequent, and continued to be used to a much later period, indeed is still to be seen in almost every village along the Rhine. The lower part of the A. is there usually pierced by two or three round arched windows, often of irregular size and height, over which there is invariably an external gallery supported by pillars, in the form of which the rude idea of a Roman pillar is at once apparent; and the whole is joined to the end of the nave, which rises considerably above it, by a roof in the form of a segment of a cone. In larger churches there is a complete row of windows of the same rounded form, divided by pillars similar to those by which the gallery is supported, and under them frequnetly a line of arches of corresponding construction, while one or two small and irregular holes of the same form give a scanty light to the crypt beneath. Many of the smaller churches have no aisles; and the semicircular A. forms the termination of, or rather contains, the chancel. The more complete specimens of the style, however, such as the minster at Bonn, afford—with the exception of the transepts and the towers, which are later additions—about the most perfect examples to be found on this side of the Alps of the form of the Roman basilica, at first adapted to Christian uses. Several examples of the A. are to be seen in ecclesiastical structures in the United States, and the feature has been introduced with fine effect in library buildings, etc.

APSIS, n. *ăp'sĭs*, or APSE, n. *ăps*, APSIDES, n. plu. *ăp'sĭ-dēz* [Gr. *hapsis*, a junction]: one of the two extreme points in the orbit of a planet—the one at the greatest, the other at the least distance from the sun. The term A. is also applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other furthest from, its primary; corresponding, in the case of the moon, to the perigee and apogee. A right line connecting these extreme points is called the line of A. In all the planetary orbits, this line has no fixed position in space, but makes a forward motion in the plane of the orbit, except in the case of the planet Venus, where the motion is retrograding. This fact in the orbit of the earth gives rise to the anomalistic year (q.v.) This advancing motion of the line of A. is especially remarkable in the orbit of the moon, where it amounts to 40° 40′ 32″ 2 annually, an entire revolution thus taking place in rather less than nine years.

APT, a. *ăpt* [F. *apte*—from L. *aptus*]: ready; quick; fit; suitable. APT'LY, ad. *-lĭ*. APT'NESS, n. readiness or quickness in learning; fitness. APTITUDE, n. *ăp'tĭ-tūd* [mid. L. *aptĭtūdo*, fit time, fitness]: a disposition for; readiness; docility.—SYN. of 'apt': ready; prompt; clever; fit; meet; suitable; quick; liable; disposed; qualified; inclined.

APTEROUS, a. *ăp'tėr-ŭs* [Gr. *a*, without; *ptĕron*, a wing]: without wings. APTERA, n. *ăp'tėr-ă*, a division of insects in which the adult is destitute of wings, as in the lice. In the Linnæan system, the *Aptera* form an order of insects; but more important distinctive characters being found to belong to the insects included in it, it is no longer retained as an order or principal division in the best entomological systems.

APTERYX, n. *ăp'tėr-ĭks:* a genus of cursorial birds peculiar to New Zealand, which form a family of the group to which the ostrich-like birds belong, as also the extinct moas and æpyornis. The beak is long and slender; the legs and thighs strong; the claws of the three anterior toes are used as weapons of offense. The wings are merely rudimentary, and concealed by the loose, almost hair-like plumage. The feathers of the dorsal plumage are lanceolate and composed externally of long, disunited filaments, the downy portion towards the root much developed. The wings have not the accessory plumage so highly developed in some of the struthious birds. The skin is very tough. Four species have been described; the largest (*Apteryx haasti*) stands about 3 ft. high; the smallest (*A. Mantėlli*) is about 23 in. from tip of beak to toe. The other two species are *A. Australis* (of which perhaps *A. Mantelli* is only a variety) and *A. Oweni*. Worms are the A.'s chief food, in search of which it deftly insinuates its flexible beak into the soft earth. The A. also eats insects, grubs, and some berries. It is nocturnal in its habits, and its nest is at the base of a hollow tree, or in deep holes in the ground. The native name is *kiwi-kiwi*.

APTITUDE, APTLY, APTNESS, etc.: see under APT.

APTOTE, n. *ăp'tōt* [Gr. *a*, without; *ptōtos*, that can, or is wont to fall]: an indeclinable noun.

APULIA, *â-pū'lĭ-a:* part of ancient Iapygia (so named after Iapyx, son of Dædalus); now includes the s.e. part of Italy as far as the promontory of Leuca, and also the extreme peninsula of Calabria. Here, in ancient times, lived three distinct peoples—the Messapians or Salentini, the Peuceni, and the Dauni or Apulians. According to old Latin traditions, Daunus, king of the Apulians, when banished from Illyria, settled in these parts of Italy. Later traditions say that Diomedes, the Ætolian, with several other heroes returning from the Trojan war, came to Italy, and, in his war with the Messapians, was assisted by Daunus, but was afterwards deprived of his territory, and put to death. Roman poetry has preserved these old names; but in history, no mention is made of any king of A., though we find the names of its principal cities—Arpi, Luceria, and Canusium. The second Punic war was for some time carried on in A. In the present day, A. (now styled PUGLIA) is merely the name of a compartment, which has no political meaning, and which includes the three provinces of Capitanata or Foggia, Bari, and Terra di Otranto or Lecce.

APURE, *â-pô′rā:* navigable river of Venezuela, which is formed by the junction of several streams among the e. Cordillera, and flows about 300 m. eastward, past the towns of Nutrias and San Fernando, till it falls into the Orinoco, in lat. 7° 40′ n. and long. 66° 45′ w.

APURIMAC, *â-pô-rē-mâk′:* river of Peru, which, after a course of 500 m., assumes the name, first, of Tambo, and then of Ucayali (q.v.). which finally joins the Tangaragua to form the Amazon. The A. proper rises to the n.w. of the great table-land of Lake Titicaca, receiving from it, however, no portion of its waters.

APUS, n. *ā′pŭs* [Gr. *a*, without; *pous*, a foot]: a genus of the *phyllop′ŏda*, having 60 pairs of apparent feet, all but two foliaceous or leaf-like, often found in great numbers in pools and ditches; a bird so called because it did not use its feet; a martinet or martin, a bird with very small feet; in *astron.*, a constellation near the s. pole.

APYRENUS, n. *ā′pī-rē′nŭs* [Gr. *a*, without; *pūrēn*, a seed]: in *bot.*, fruit which produces no seeds, as cultivated varieties of the orange, pineapple, etc.

APYREXY, n. *ā′pĭr-ĕk′sĭ* [Gr. *a*, *pŭres′so*, I have fever —from *pur*, fire]: the intermission of a fever. APYROUS, a. *ā′pĭr-ŭs*, fire-proof; incombustible; that sustains a strong heat without alteration. APYRETIC, a. *ā′pĭr-ĕt′ĭk*, without fever.

AQUA, n. *ā′kwă* or *ăk′wă* [L. *aqua*, water]: a word now much used as part of a compound. AQUAFORTIS, *-fŏr′tĭs* [L. *fortis*, strong]: strong water; a powerful acid, so called by the alchemists, now named *nitric acid*. AQUA MARINA, *-mă-rē′nă* [L. *mărĕ*, the sea]: sea-water; applied to the precious stone, beryl, from its color. AQUA MARINE, n. *ā′kwă mă-rēn′*, the varieties of the *beryl* (q.v.) which are green or blue—the yellow variety is strictly called beryl; some green and blue varieties of topaz also have been thus called. AQUA REGIA, *-rē′jĭ-ă* [L. *regĭus*, royal]: royal water; a mixture of nitric and muriatic acids; a dissolvent of gold, the king of the metals; now called *nitro-muriatic acid*. AQUA REGINÆ, literally *queen's water*, mixture of concentrated sulphuric acid (oil of vitriol) and nitric acid, or of sulphuric acid and nitre. Either mixture evolves much fumes, and may be used as a disinfectant, as similar mixtures are sold under the name of *everlasting disinfectants*. AQUA VITÆ, *-vī′tē* [L. *vita*, life]: water of life; brandy or other ardent spirit. During the alchemical epoch, brandy or distilled spirits was much used as a medicine, was considered a cure for all disorders, and thought to prolong life; and as Latin was the learned tongue, this restorer of health and prolonger of life was called *aqua vitæ*. AQUATIC, a. *ă-kwăt′ĭk*, living in the water or much on it, as some fowls. AQUARELLE, n. *ăk′wâr-ĕl* [L. dim. of *aqua*, water]: a painting in water colors. AQUARIUM, n. *ă-kwā′rĭ-ŭm*, a glass case containing water, etc., for plants and creatures that live in water; any large building where such cases are kept and exhibited. AQUARIUS, n. *ă-kwā′rĭ-ŭs* [L. a water-carrier]: a sign of the zodiac. AQUA TINTA, *ā′kwa tĭn′ta*,

or AQUATINT, n. *ā'kwŏ-tĭnt* [L. *aqua:* It. *tinta,* a tint or dye—from L. *tingo,* I stain]: a mode of etching on copper, by which imitations of drawings in Indian ink, bister, and sepia are produced. On a plate of copper a ground is prepared of black resin, on which the design is traced; a complicated series of manipulations with varnish and dilute acid is then gone through, until the desired result is attained. The process of A. has fallen into comparative disuse.

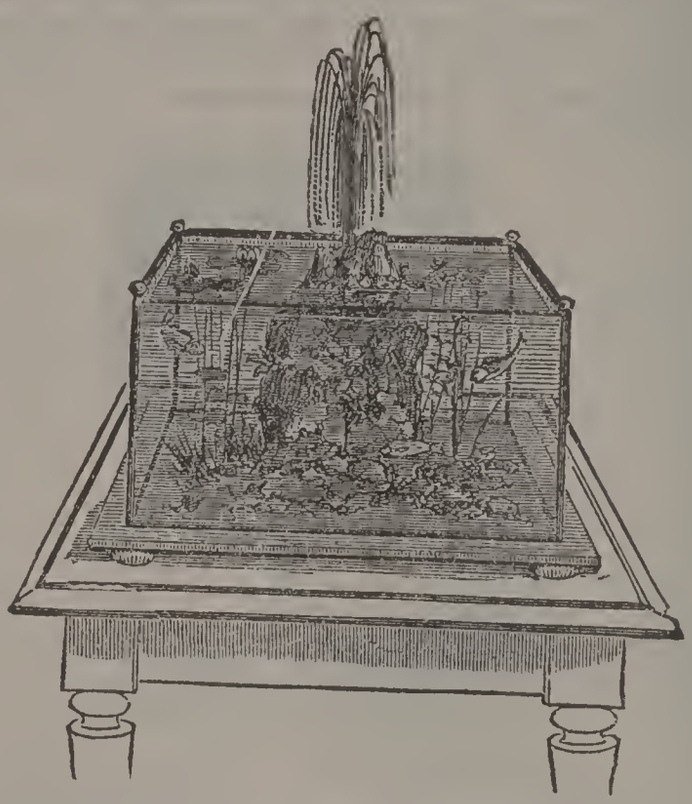
AQUA'RIUM: a tank or vessel containing either salt or fresh water, in which either marine or fresh-water plants and animals are kept in a living state. The name was formerly sometimes given to a tank or cistern placed in a hot-house, and intended for the cultivation of aquatic plants. The A., as now in use—originally called *Vivarium* or *Aquavivarium,* and intended chiefly for animals, depends in principle upon the relations discovered by science between animal and vegetable life, and particularly upon the consumption by plants, under the action of light, of the carbonic acid gas given forth by animals, and the consequent restoration to the air or water in which they live of the oxygen necessary for the maintenance of animal life. The A. must therefore contain both plants and animals, and in something

Simple form of an Aquarium.

like a proper proportion. Zoophytes, Annelides, Mollusca, Crustacea, and fishes may thus, with due care, be kept in health, and their habits observed. The water must be frequently *aerated,* which can be accomplished by taking up portions of it and pouring them in again from a small height. The fresh-water A. is frequently provided with a fountain, which produces a continual change of water; but even where this is the case, the presence both of plants and animals is advantageous to the health of both. When sea water cannot easily be procured for the marine A., a substitute may be made by mixing with rather less than 4 quarts of spring water 3½ ounces of common table-salt, ¼ ounce of Epsom salts, 200 grains troy of chloride of magnesium, and

40 grains troy of chloride of potassium. With care, the water may be kept good for a long time. No dead animal or decaying plant must be permitted to remain in it. Salt water, artificially prepared, is not fit for the reception of animals at once; but a few plants must first be placed in it, for which purpose some of the green algæ, species of *Ulva* or *Conferva*, are most suitable. The presence of a number of molluscous animals, such as the common periwinkle, is necessary for the consumption of the continually growing vegetable matter, and of the multitudinous spores (seeds), particularly of confervæ, which would otherwise soon fill the water, rendering it greenish or brownish, and untransparent, and which may be seen beginning to vegetate everywhere on the pebbles or on the glass of the tank. In a fresh-water A., molluscous animals of similar habits, such as species of *Lymnæa* or *Planorbis*, are equally indispensable. For large aquaria, tanks of plate glass are commonly used; smaller ones are made of bottle-glass or of crystal.

Blennies, gobies, and gray mullets are perhaps the kinds



Aquarium with Fountain for Aerating.

of fish most common in marine aquaria; gold-fishes, sticklebacks, and minnows are frequent in fresh-water ones. These have the advantage of being more easily kept in good health than many other kinds, and a further recommendation is found in their small size, and in the fine colors of the gold-fish. The nests of sticklebacks are a subject of unfailing interest. Crabs of various species, and actiniæ or sea-anemones, are very generally among the larger inmates of the A. Serpulæ contribute much both to its interest and beauty, as they spread out their delicate and finely-tinted branchiæ from the mouth of their shelly tube, and withdraw within

it, quick as thought, upon the slightest disturbance. Balani or acorn-shells are very beautiful objects when they are seen opening their summit-valves, and rapidly stretching out and retracting their little nets. Even periwinkles and limpets are interesting, particularly when they are watched by the aid of a magnifying-glass, as they feed upon the spores of the confervæ which have just begun to vegetate on the glass of the A., moving slowly along, with continual opening and shutting of the mouth, like cows at pasture, when the structure and motions of their mouths and the singular beauty and brilliancy of colors may be observed. The use of a good magnifying lens adds greatly to the interest of the A., and zoophytes of exquisite forms and colors may be watched in the actual processes of life. See WARDIAN CASES.

AQUARIUS, *ă-kwā′rĭ-ŭs*, the Water-bearer: the eleventh sign of the zodiac, through which the sun moves in part of the months of January and February. It is also the name of a zodiacal constellation, whose position in the heavens may be found by producing a line in a southerly direction through the stars in the head of Andromeda and the wing of Pegasus.

AQUATIC PLANTS and ANIMALS: those that live either wholly or partly in water. The term is very vaguely used, those plants being often called A. which grow in ponds, ditches, etc., although not only their inflorescence, but great part of their foliage, is above the surface of the water, as well as those which more completely belong to that element; and a similar latitude of meaning prevails with regard to animals. Few phanerogamous (or flowering) plants exist

Aquatic plant.

entirely under water, although there are a few, like the common *Zostera marina*, or Grass-wrack, which do so, and produce even their flowers in that condition; others, of which the greater part of the plant is usually under water, produce their flowers upon, or considerably above, its surface, as those of the genera *Valisneria*, *Anacharis* (q.v.), etc. The leaves, as well as the flowers, of many float upon the water, of which the water-lilies furnish well-known and beautiful examples; while in *Ranunculus aquatilis*, that exquisite ornament of river margins, we have an instance of great diversity between the lower leaves which remain submersed, and the upper leaves which float. Of crypto-

gamous plants, one great order, *Algæ*, is exclusively A., and these seem adapted to perform under water all the functions of their life. A. plants are, in general, of less compact structure than other plants, thus lighter and better adapted for rising in their growth towards the surface of the water; in order to which also some of the algæ, as may be seen in more than one of the most common sea-weeds, are provided with air-bladders of considerable magnitude. All this is the more necessary, as plants completely A. have generally little firmness of stem, and if their weight made them fall to the bottom would lie in a mass, as they do when withdrawn from the water, in which, however, they gracefully float, their flexibility of stem enabling them to adapt themselves to waves or currents which would destroy them if they were more rigid. So admirably are all things in nature harmonized.

Many animals, to a considerable extent A. in their habits, must not only breathe air, but are adapted for spending great part of their existence on dry land. Such are chiefly those that seek their food in the water. The peculiarities of structure by which they are fitted for wading, for swimming, for diving, and for remaining under water a longer time than other animals can, are very interesting and admirable. Even the fur of the beaver, the otter, the water-rat, and other animals of this description, is not liable to be drenched like that of other quadrupeds; and the plumage of water-fowls exhibits a similar peculiarity. The feet of many are webbed, so as to enable them to swim with great facility; and to this the general form, as in water-fowls, likewise exhibits a beautiful adaptation. The webbed feet in some, of which the habits are most thoroughly A., as seals, assume the character of a sort of paddle, admirably fitted for use in the water, but by means of which they can only move very awkwardly on land. The forms of whales and fishes are remarkably adapted for progression in water; while, instead of the limbs by which other vertebrate animals are enabled to move upon the land or to fly in the air, their great organ of locomotion is the tail, or rather the hinder part of the elongated body itself, with the tail as the blade of the great oar, which all the principal muscles of the body concur to move. Remarkable provision is made in A. animals of the higher vertebrate classes for the maintenance of the requisite animal heat, by the character of the fur or plumage; a purpose which the blubber of whales also most perfectly serves. In the colder-blooded animals, where no such provision is requisite, the structure of the heart is accommodated to the diminished necessity for oxygenation of the blood; and although reptiles in their perfect state must breathe air, many of them can remain long under water without inconvenience. Fishes, and the many other animals provided with branchiæ or gills, breathe in the water itself, deriving the necessary oxygen, which in their case is comparatively little, from the small particles of air with which it is mingled. They cannot subsist in water which has been deprived of air by boiling. Some A. insects carry down with them into the water

particles of air entangled in hairs with which their bodies are abundantly furnished.

A′QUA TOFA′NA: a poisonous liquid much talked of in the s. of Italy about the end of the 17th c. There is doubt as to its inventor, but it is ascribed to a Sicilian woman named Tofana, who lived first at Palermo, but was obliged, from the attention of the authorities having been attracted to her proceedings, to take refuge in Naples. She sold the preparation in small phials, inscribed 'Manna of St. Nicholas of Bari,' there being a current superstition that from the tomb of that saint there flowed an oil of miraculous efficacy in many diseases. The poison was especially sought after by young wives that wished a riddance of their husbands. The number of husbands dying suddenly in Rome about 1659 raised suspicion, and a society of young married women was discovered, presided over by an old woman named Spara, who had learned the art of poisoning from Tofana. Spara and four other members of the society were publicly put to death. Tofana continued to live to a great age in a cloister, in which she had taken refuge, but was at last (1709) dragged from it, and put to the torture, when she confessed having been instrumental to 600 deaths. According to one account she was strangled; but others affirm that she was still living in prison in 1730.

The A. T. is usually described as a clear, colorless, tasteless, and inodorous fluid; five or six drops were sufficient to produce death, which resulted slowly and without pain, inflammation, or fever; under a constant thirst, a weariness of life, and an aversion to food, the strength of the person gradually wasted away. It is even stated that the poison could be made to produce its effects in a determined time, long or short, according to the wish of the administrator—a notion generally prevalent in those ages respecting secret poisoning. The most wonderful stories are told of the mode of preparing this poison; for example the spittle of a person driven nearly mad by continued tickling was held to be an essential ingredient. Later investigations lead to the belief that the A. T. was principally a solution of arsenic.

AQUEDUCT, n. *ăk′wĕ-dŭkt* [L. *aqua*, water, or *aquæ*, of water; *ductus*, led]: a course or channel made for conveying water either under or above ground. AQUEOUS, a. *ā′kwĕ-ŭs*, watery; pertaining to or arising from water. A′QUEOUS′NESS, n. the quality of being watery.

AQUEDUCT: an artificial course or channel by which water is conveyed along an inclined plane. When an A. is carried across a valley, it is usually raised on arches, and where elevated ground or hills intervene, a passage is cut, or, if necessary, a tunnel bored for it. Aqueducts were not unknown to the Greeks; but there are no remains of those which they constructed, and the brief notices of them by Pausanias, Herodotus, and others, do not give any distinct

notion of their character. The aqueducts of the Romans were among the most magnificent of their works and the noble supply of water which modern Rome derives from the three now in use, of which two are ancient, gives the stranger a vivid conception of the vast scale on which the ancient city must have been provided with one of the most important appliances of civilization and refinement, when nine were employed to pour water into its baths and fountains.

The following are the names of the Roman aqueducts, chronologically arranged.

1. The *Aqua Appia*, begun by and named after the censor Appius Claudius abt. B.C. 313. It ran a course of between 6 and 7 m., its source being in the neighborhood of Palestrina. With the exception of a small portion near the Porta Capena, it was subterranean. No remains of it exist.

2. *Anio Vetus*, constructed abt. B.C. 273, by M. Curius Dentatus. It also was chiefly underground. Remains may be traced both at Tivoli and near the Porta Maggiore. From the point at which it quitted the river, Anio, about 20 m. above Tivoli, to Rome, is about 43 miles.

3. *Aqua Marcia*, named after the pretor Quintus Marcius Rex, B.C. 145, had its source between Tivoli and Subiaco, and was consequently abt. 60 m. long. The noble arches which stretch across the Campagna for some 6 m. on the road to Frascati are the portion of this A. which was above ground.

4. *Aqua Tepula*, B.C. 126, had its source near Tusculum, and its channel was carried over the arches of the last-mentioned aqueduct.

5. *Aqua Julia*, constructed by Agrippa, and named after Augustus, B.C. 34. Like the Tepulan, it was carried along the Marcian Arches, and its source was also near Tusculum. Remains of the three last-mentioned aqueducts still exist.

6. *Aqua Virgo*, also constructed by Agrippa, and said to have been named in consequence of the spring which supplied it having been pointed out by a girl to some of Agrippa's soldiers when in search of water. The Aqua Vergine, as it is now called, is still entire, having been restored by the popes Nicholas V. and Pius IV., 1568. The source of the Aqua Virgo is near the Anio, in the neighborhood of Torre Salona, on the Via Collatina, and about 14 m. from Rome. The original object of this A. was to supply the baths of Agrippa; its water now flows in the Fontana Trevi, that of the Piazza Navona, the Piazza Farnese, and the Barcaccia of the Piazza di Spagna. The water of the Aqua Virgo is the best in Rome.

7. *Aqua Alsietina*, constructed by Augustus, afterwards restored by Trajan, and latterly by the popes. This A., now called the Aqua Paola, is situated on the right bank of the Tiber, and supplies the fountains in front of St. Peter's and the Fontana Paola on the Montorio. Its original object

was to supply the Naumachia of Augustus, which was a sheet of water for the representation of sea-fights.

8. *Aqua Claudia*, commenced by Caligula, and completed by Claudius A.D. 51. A line of magnificent arches which formerly belonged to this A. still stretches across the Campagna, and forms one of the grandest of Roman ruins. It was used as a quarry by Sextus V. for the construction of the Aqua Felici, which now supplies the Fountain of Termini, and various others in different parts of the city.

9. *Anio Novus*, which was the most copious of all the Roman fountains, though inferior to the Marcia in the solidity of its structure; it was also the longest of the aqueducts, pursuing a course of no less than 62 m. By the two last-mentioned aqueducts, the former supply of water was doubled. In addition to the aqueducts already mentioned, there was the Aqua Trajana, which may, however, be regarded as a branch of the Anio Novus, and several others of later construction, such as the Antoniana, Alexandrina, and Jovia, none of which were to be compared with the older ones in extent and magnificence.

Nor was it for the uses of the capital alone that aqueducts were constructed. The A. of Trajan, at Civita Vecchia, which conveys the water a distance of 23 m., and that in the vicinity of Marzana, near Verona, with others that might be mentioned, still attest the existence of aqueducts in the smaller towns of Italy in Roman times. Even during the unpromising period which succeeded, the habit of their construction was not abandoned, that of Spoleto having been built by the Lombard Duke Theodolapius in 604. The extraordinary A. by which the fountain at Siena is supplied is said to have occupied two centuries in building; and the modern A. of Leghorn, which is not unworthy of the Roman models after which it was designed, is surpassed in magnificence by that of Pisa, with its thousand arches. In the more distant provinces which fell under the Roman power, aqueducts were likewise constructed —at Nicomedia, Ephesus, Smyrna, Alexandria, Syracuse, and in many of the towns in Gaul and in Spain. At Merida there are the remains of two aqueducts, of one of which there are 37 piers still standing, with three tiers of arches. But the most magnificent structure of this class in Spain, is the A. of Segovia, in Old Castile, for which Spanish writers claim an antiquity beyond that of the Roman dominion; but which, there is reason to believe, belongs to the time of Trajan. At Evora, in Portugal, there is likewise an A. in good preservation, with a *castellum* or reservoir at its termination in the city, consisting of two stories, the lower one being decorated with pillars. But of all the provincial aqueducts, the Pont du Gard at Nismes, in Provence, is at once the most remarkable and the best preserved. It consists of three rows of arches, raised one above the other, each smaller than the one below it; the highest range of arches carries a small canal, about 4½ ft. high and 4 ft. wide. It is covered with stone slabs, along which it is possible to walk from one end

to the other, and to overlook the valley of the Gardon. The height is 188 ft., and the length of the highest arcade 873 ft. Its use was to convey to the town of Nismes the water of two springs, 25 m. distant. Neither the date nor the builder of the Pont du Gard is known with certainty, but it is ascribed to Agrippa, the nephew of Augustus; a conjecture which is rendered probable by the fact of his having restored the Appian, Marcian, and Anienian, and constructed the Julian A. at Rome. The importance which the Romans attached to their aqueducts may be gathered from the fact that special officers, invested with considerable authority, and, like all the higher officials, attended by lictors and public slaves, were appointed for their superintendence. Under the orders of these 'guardians of the waters,' we are told that, in the time of Nerva and Trajan, about 700 architects and others were employed in attending to the aqueducts. These officials were divided into various classes, and known by different names, according as their duties related to the care of the course of the A., the *castella* or reservoirs at its termini, the pavement of the channel, the cement with which it was covered, and the like.

Among modern aqueducts (using the word in its restricted sense of a masonry construction for water-conveyance) the A. built to convey the waters of the river Eure to Versailles, France, is considered in many respects the finest in the world. It is about five-sixths of a m. long, more than 200 ft. high, and contains 726 50-ft. arches, divided into three rows. The subterranean A., which conducts water to the village of Arcueil, France, is 44,300 ft., or more than 8 m. long and 6 ft. high. A similar A., belonging to the Versailles system, is 11,760 ft. long. The great water-works which supply Marseilles include several aqueducts, of which the largest crosses the ravine of the river Arc, about 5 m. from Aix, and is 1,287 ft. long and 262 ft. high.

The Liverpool A. is one of the largest in the world; length 70 m., capacity 40,000,000 gallons per day. The supply is drawn from Lake Vyrnwy, Wales, whose available contents are over 12,131,000,000 gallons. Total cost of the work, about $10,000,000.

For the Croton A. of New York, and for several others, see titles of various cities. See WATER SUPPLY.

AQUEOUS HUMOR, *ā'kwĕ-ŭs:* the fluid which occupies the space in the eye between the back of the cornea and the front of the lens, which, in fœtal life, is divided into an *anterior* and *posterior* chamber by the membra pupillaris (q.v.), and in adult life by the iris. It consists of water, with, according to Berzelius, about a fiftieth of its weight made up of chloride of sodium and extractive matters held in solution. It is rapidly re-secreted if allowed to escape by any wound in the cornea, and in some cases is formed in such quantity as to cause dropsy of the eye (*hydrophthalmia*).

AQUEOUS ROCKS

AQUEOUS ROCKS: are those laid down through the agency of water; they are secondary in character, being derived from pre-existing rocks. There are several ways in which aqueous rocks may be formed. First, water being a universal solvent takes material into solution, from which state it may be precipitated by chemical action or by evaporation, cooling of the water or by release of pressure when deep seated waters reach the surface of the earth, and rock deposits are thus formed. Second, sediments which are insoluble in water are held in mechanical suspension and deposited whenever conditions permit: these comprise the sedimentary or clastic rocks and form over three-fourths of the earth's surface rocks. Third, rocks may be formed in whole or in part, directly from the remains of plants or animals which live in water or which have been transported thither; these are the organagenous rocks.

The first group are chemical precipitates chiefly; they do not form extensive deposits but they are of great economic importance. Under this head are included a larger part of the iron ore deposits, silica in the form of chalcedony, agate, flint, opal, etc., cave deposits, stalactites, stalagmites, travertine; gypsum, salt, the various hydrocarbons including natural gas, petroleum, asphaltum and other types.

The second group includes all rocks formed from sediments. The surface of the earth is ordinarily composed of loose unconsolidated material, derived from the disintegration of rocks. This mantle rock consists of gravel, sand and clay. Much of it is so fine that it can be carried away readily by streams and even in part by wind. It is transported to the sea, to lakes, it is deposited in the rivers, or it may accumulate in gently sloping valleys or plains rather than under water.

As a rule the clastic rocks are bedded because their materials are sorted and laid down by water, that is, they are arranged in layers called strata, hence the term stratified rocks often applied to them. The stratification may be regular or irregular: in the latter case the term cross bedding is applied to the structure.

The unconsolidated material after deposition gradually passes into compact rock partly by consolidation but chiefly through the cementing action of silica, calcium, carbonate, iron and other materials deposited around the individual grains of the mass. After consolidation the rock may undergo numerous changes and various secondary structures may be developed. Of these, the phenomeon termed jointing is most important; it consists of numerous deep rocks or fissures usually approaching verticality, which traverse the rock at intervals and divide it up into blocks. Clastic rocks may be composed of ravel and even boulders: these are the conglomerates; if the pebbles are round, the rock is pudding stone; if angular, a breccia; sand forms sandstones; argillaceous

material, such as mud or clay, form shales and clay beds but if lime is present in quantity marls and limestones may result. Volcanoes may eject material which is carried into the sea and deposited.

Under the third group are included the rocks derived directly from plants and animals. The deposits may be silicous resulting from the tests of silica secreting plants and animals; such are the diatomacious and infusorial earths. The deposits may be and generally are calcareous, since animals ordinarily secrete calcium carbonate for their hard parts. Limestones of great variety and texture are thus formed. Plants under favorable circumstances when protected from the oxidizing influence of the atmosphere become slowly converted into coal. There are various stages ranging from peat to the more compact varieties, as bituminous and anthracite coal. The phosphatic material from the excrement of birds and from the bones of animals sometimes collects in favorable localities, making insignificant but very important deposits, since they are used so extensively for fertilizers. The fossils found in clastic rocks are very important in the interpretation of the rocks, both as regards age and origin.

AQUIFEROUS, a. *ă-kwĭf′ėr-ŭs* [L. *aqua*, water; *fero*, I bear]: water-bearing; denoting vessels or canals by which water is distributed throughout an organism.

AQUIFOLIACEÆ, *ăk-wĭ-fō′lĭ-ā′sē-ē:* natural order of dicotyledonous or exogenous plants, of which the common holly (q.v.) is the best known example, and the only species that is a native of Europe. The order, however, contains more than one hundred species, the greater part of which are natives of America, and many of them belong to the tropical and subtropical parts of it. The species are all evergreen trees or shrubs, with simple, leathery leaves, and without stipules. The flowers are small and axillary, with 4–6 sepals, and a 4–6-parted corolla, into which the stamens are inserted, alternating with its segments. The ovary is fleshy and superior, with two or more cells, a solitary anatropal pendulous ovule in each cell, the cells generally becoming bony as distinct *stones* in the fruits, which is fleshy. The order is allied to *Rhamnaceæ*, *Celastraceæ*, and *Ebenaceæ*. The most interesting species belong to the the genus *Ilex*, or Holly (q.v.). The fruit is always fleshy, containing from two to six indehiscent woody or fibrous nucules or minute nuts enclosing single seeds. The American holly, *Ilex opaca*, has foliage less glossy, and berries less red than its European relative, *Ilex aquifolium*. Both are important commercially, being mostly used for decorative purposes. The genera are *Ilex*, *Cassine*, *Myginda*.

AQUILA: see Eagle.

AQUILA, *ăk′wĭ-la*, Ponticus: celebrated translator of the Old Testament into Greek, lived abt. 130; b. Sinope:

said to have been a relation of the emperor Hadrian, and to have been first a Pagan, then a Christian, and finally a Jew; submitting in his last conversion to the peculiar religious ceremony of circumcision. His translation of the Old Testament—which appears to have been undertaken for the benefit of his Hellenized countrymen, was so *literal*, that the Jews preferred it to the Septuagint, as did also the Judaizing sect of Christians called Ebionites.

AQUILEGIA: see COLUMBINE.

AQUILEJA, *â-kwe-lā′yâ*, or AGLAR′ (earlier, Velia or Aquila): small town in Austria, at the head of the Adriatic, 22 m. w.n.w. of Trieste. Pop. about 2,000. It is now sunk in utter insignificance, possessing no trade or public buildings of any note, except its cathedral; but in the time of the Roman emperors, it was one of the most important places n. of the metropolis. Founded by a Roman colony, B.C. 181, it became a favorite residence of Augustus; and A.D. 168, was so strongly fortified by Marcus Aurelius, as to be considered the first bulwark of the empire on the n. It was called *Roma Secunda*, the Second Rome. Here the emperor Maximin perished; and in the vicinity Constantius lost his life in a battle against his brother Constans. When the town was destroyed by Attila (452), it had 100 000 inhabitants. It never recovered, but has continued slowly dwindling down into deeper obscurity. Councils were held at A. in 381, 558, 698, and 1184.

AQUILINE, a. *ăk′wĭ-lĭn* [L. *aquila*, an eagle]: hooked or curved like the beak of an eagle.

AQUINAS, *a-kwī′nas*, THOMAS, or THOMAS OF AQUINO: 1224–74; b. in the castle of Rocca Secca; of the family of the Counts of Aquino, in the kingdom of Naples: one of the most influential of the scholastic theologians. He received the rudiments of his education from the Benedictine monks of Monte-Casino, and completed his studies at the Univ. of Naples. A strong inclination to philosophical speculation determined the young nobleman, against the will of his family, to enter (1243) the order of Dominicans. In order to frustrate the attempts of his friends to remove him from the convent, he was sent away from Naples, with the view of going to France; but his brothers took him by force from his conductors, and carried him to the paternal castle. Here he was guarded as a prisoner for two years, when, by the help of the Dominicans, he contrived to escape, and went through France to the Dominican convent at Cologne, in order to enjoy the instructions of the famous Albertus Magnus (q.v.). According to another account, he owed his release from confinement to the interference of the emperor and the pope. Thoroughly imbued with the scholastic, dialectic, and Aristotelian philosophy, he came forward, after a few years, as a public teacher in Paris. His masterly application of this philosophy to the systematizing of theology, soon procured him a distinguished reputation.

It was not, however, till 1257, that A. obtained the degree of doctor, as the university of Sorbonne was hostile to the mendicant monks. He vindicated his order in his work, *Contra Impugnantes Dei Cultum et Religionem;* and, in a disputation in presence of the pope, procured the condemnation of the books of his adversaries. He continued to lecture with great applause in Paris, till Urban IV., in 1261, called him to Italy to teach philosophy in Rome, Bologna and Pisa. Finally he came to reside in the convent at Naples, where he declined the offer of the dignity of archbishop, in order to devote himself entirely to study and lecturing. Being summoned by Gregory X. to attend the General Council at Lyons, he died on the way, 1274, at Fossanuova, in Naples.

Even during his life A. enjoyed the highest consideration in the church. His voice carried decisive weight with it; and his scholars called him the 'Universal,' the 'Angelic Doctor,' and the 'Second Augustine.' A general chapter of Dominicans in Paris made it obligatory on the members of the order, under pain of punishment, to defend his doctrines. It was chiefly the narratives of miracles said to have been wrought by A. that induced John XXII., in 1323, to give him a place among the saints. His remains were deposited in the convent of his order at Toulouse. Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew, and was almost equally ignorant of history; but his writings display a great expenditure of diligence and dialectic art, set off with the irresistible eloquence of zeal. His chief works are—a *Commentary on the Four Books of Sentences of Peter Lombard*, the *Summa Theologiæ*, *Quæstiones Disputatæ et Quodlibetales*, and *Opuscula Theologica*. He gave a new and scientific foundation to the doctrine of the church's treasury of works of supererogation; to that of withholding the cup from the laity in the communion, and to transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the 'Father of Moral Philosophy.' The definiteness, clearness, and completeness of his method of handling the theology of the church gave his works a superiority over the text-books of the earlier writers on systematic theology. His *Summa Theologiæ* is the first attempt at a complete theological system. Accordingly, Pius V., to whom is due the publication of the completest collection of A.'s works (18 vols., Rome, 1570; a newer but less trustworthy ed., 23 vols., Paris, 1636–41), ranks him with the greatest teachers of the church. The circumstance of A. being a Dominican, and boasted of by his order as their great ornament, excited the jealousy of the Franciscans against him. In the beginning of the 14th c., Duns Scotus (q.v.), a Franciscan, came forward as the declared opponent of the doctrines of A., and founded the philosophico-theological school of the Scotists, to whom the *Thomists*, mostly

Dominicans, stood opposed. The Thomists leaned in philosophy to Nominalism (q.v.) although they held the abstract form to be the essence of things; they followed the doctrines of Augustine as to grace, and disputed the immaculate conception of the Virgin. The Scotists inclined to Realism (q.v.), and to the views of the Semi-pelagians, and upheld the immaculate conception. A.'s ablest philosophical writing is his *Summa Fidei Catholicæ contra Gentiles.* As a philosopher A. brought Scholasticism to its climax through the most complete accommodation of the Aristotelian philosophy to the doctrines of the church. Knowledge and, above all, the knowledge of God are the highest end of human life. God's existence is demonstrable only *a posteriori,* that is, from the world as his creation. There must be a first mover, or first cause, because the series of events, from cause to effect and thence to new effects on indefinitely, cannot be endless. Again the order in the world must be due to some one who has ordered the world. The world is not eternal, but was created by God from nothing at a moment in time when time itself began. The immortality of the soul follows from its immateriality, for our intellect, as opposed to the lower faculties of the soul, has no bodily organ.

Nature is a hierarchy in which each stage is the goal of a lower stage and itself looks forward to a higher stage. In the realm of bodies man is the goal; but his earthly life in turn looks to a higher or spiritual life, developed in the church and nourished by the sacraments. The realm of nature is thus a lower stage to the realm of grace. Similarly is the natural man to the Christian, philosophy to theology, matter to the sacraments, the state to the church and the emperor to the pope. The universe with its two realms is the best possible world, for God in his wisdom could have conceived and created none other.

AQUITANIA, *ăk-wē-tā′nĭ-a:* Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes. Augustus, when he divided Gaul into four provinces, added to A. the country lying between the rivers Garonne and Loire. Afterwards A. passed into the hands, first, of the West Goths, and then of the Franks; and during the Merovingian dynasty, became an independent duchy. Though subjugated by Charlemagne, the duchy again claimed independence under the weak monarchs of the Carlovingian dynasty. In 1137, it was united to the crown of France by the marriage of Louis VII. with Eleanor, heiress of A. In 1152, A. became an English possession through the marriage of Henry II. with Eleanor. A. was ultimately united to the crown of France by Charles VII., 1451.

ARAB, n. *ăr′ăb,* or ARABIAN, n. *ă-rā′bĭ-ăn,* a native of Arabia. ARABIC, a. *ăr′ă-bĭk,* or ARABIAN, a. *ă-rā′bĭ-ăn,* pertaining to Arabia or to the language of its people. AR′ABIC, n. the language. ARABIST, n. *ăr′ă-bĭst,* one versed in Arabic. ARABESQUE, a. *ăr′ă-bĕsk* [F.]: in the

manner of the Arabian architecture: N. an ornament in *arch.*, consisting of imaginary foliage, stalks, plants, etc.; the Arabic language. AR'ABISM, n. *-bĭzm*, an Arabic idiom. ARABY, n. *ăr'ă-bĭ*, *poetic* for Arabia. ARABS, n. plu., the wandering tribes of Arabia and Northern Africa; now applied to the destitute children wandering in the streets of towns. ARABIC NUMERALS, the ordinary figures used in arithmetic, introduced into Europe by the Arabians.

ARABESQUE, *ăr'ă-bĕsk:* meaning merely *after the Arabian manner*, so far as its etymology is concerned, might be general in its application. It is, however, used especially to characterize a peculiar kind of fantastic decoration commonly employed in conjunction with architecture, and which the Spanish Moors are supposed to have introduced into modern Europe. But the species of enrichment to which this term is now applied was extensively employed both by the Greeks and Romans, the latter in particular being masters of the style. The Egyptians, from whom the Moors probably derived their original notions of this and other forms of art, also employed it in enriching their monumental decorations. But the A. of the Moors differed from that of the Egyptians in entirely excluding the figures of animals, the representation of which was forbidden by the Mohammedan religion, and confining itself entirely to the foliage, flowers, fruit, and tendrils of plants and trees, curiously and elaborately intertwined. This limitation of the field of A. was again departed from when the decorations were discovered on the walls of the baths of Titus, in the time of Leo X.; and more recently those in the houses at Herculaneum and Pompeii came to form the models of imitation, and the modern A. consists usually of combinations of plants, birds, and animals of all kinds, including the human figure, and embracing not only every natural variety, but stepping without hesitation beyond the bounds of nature. The arabesques with which Raphael adorned the galleries of the Vatican, and which he is said to have imitated from those which he had been instrumental in discovering in the baths of Titus, are at once the most famous and the most beautiful which the modern world has produced. Arabesques are usually painted, though the term is also applied to sculptural representations of similar subjects in low relief, and to carved or molded metal work. See GROTESQUE: ORNAMENTATION.

ARABGIR, *â-râb-ghēr'*, or ARABKIR, *-kēr'* (anc. *Anabrace*): town of Asiatic Turkey, in the vilayet of Sivas; in a mountainous and rocky district, not far from theEuphrates; 150 m. s.s.w. from Trebizond. It is to the enterprise and industry of the Armenians that the town owes its prosperity. It is noted for the manufacture of goods from English cotton yarn. The neighboring country is inhabited by Turcomans. Pop. abt. 30,000; of which nearly one-fourth are Armenians, and three-fourths Turks.

TURKEY IN ASIA,
PERSIA AND
AFGHANISTAN.
SCALE OF STATUTE MILES.
0 50 100 200 300 400 500
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R., MC N. & CO. ENGR S CHI.
Longitude East 50 from Greenwich.
BLACK SEA
MEDITERRANEAN SEA
ARABIAN SEA
PERSIAN GULF
GULF OF OMAN
GULF OF ADEN
TURKEY
PERSIA
AFGHANISTAN
BALUCHISTAN
ARABIA
EGYPT
AFRICA
INDIA
TRANS-CASPIAN TERRITORY
CAUCASIA
SYRIAN DESERT
EL RAB EL KHALI
HADRAMAUT
TROPIC OF CANCER
NILE RIVER
CONSTANTINOPLE
TEHERAN
CABOOL
CAIRO

ARABIA, *ă-rā'bĭ-a*—called by the inhabitants, Jezirat-al-Arab (the peninsula of A.); by the Turks and Persians, Arabistân: the great s.w. peninsula of Asia; 12° 40′—34° n. lat., and 32° 30′—60° e. long. Its greatest length from n.w. to s.e. is about 1,800 m.; its mean breadth, about 600; 1,230,000 sq. m. It is bounded on the n. by the highlands of Syria, and the plains of Mesopotamia (or by a line from El Arish on the Mediterranean to the Euphrates delta); on the e., by the Persian Gulf and the Gulf of Oman; on the s., by the Arabian Sea; and on the w., by the Red Sea and the Suez canal. Midway between Mecca and Medina runs the tropic of Cancer. Ptolemy is supposed to be the author of the famous threefold division into *Arabia Petræa*, i.e., the Arabia of the city of Petra, in the n.w.; *Arabia Felix* (an incorrect translation of *Yemen*, which does not signify 'happy,' but the land lying to the *right* of Mecca), along the w. and s.w. coasts; and *Arabia Deserta*, in the interior. The more precise divisions are; the *Sinaitic Peninsula* (see SINAI), between the Gulfs of Suez and Akaba; the *Hedjaz* (Land of Pilgrimage), the larger and northern strip to the e. of the Red Sea; *Yemen*, the s. and smaller strip to the e. of the Red Sea; *Hadramaut*, the region along the southern coast; *Oman*, the extreme s.e. end of the peninsula, as large as England and Wales; *El-Hasa*, along the Persian Gulf; *Nejd*, the Central Highlands of Arabia.

In shape, A. is an irregular parallelogram, broadest at the s. end; in character, it is mainly African. The vast central plateau rises from a height of 2,500 ft. in the n. to 7,000 ft. in the s.w., and is bounded by w. and s. mountain chains, the former attaining, s. of Mecca, a height of 8,500 ft. Between the mountains and the sea is a low hot strip of land, partially fertile, of varying width. There is a desert in the n. of the interior, the mountainous country of Nejd near the very centre, and to the s. of Nejd another very sterile sandy desert. Hedjaz and Yemen extend from the Red Sea indefinitely towards the interior, and consist partly of the *Tehama*, or low country, along the sea, and partly of the mountain district beyond. Mecca and Medina are in Hedjaz. Yemen is on the whole well watered, has rich and fertile valleys, and contains one-fifth of the whole population of Arabia Yemen has two very important commercial towns, Mocha and Loheia, on the coast of the Red Sea. Hadramaut is little known, but resembles the Hedjaz in character. Oman is mainly mountainous, is partly very fertile, and possesses the good harbor of Muscat. It has some manufactures of cotton, silk, and arms. Large portions of A. are perfectly arid, but the more fertile portions are so extensive as to constitute two thirds of the total area: one-third of the whole may be accounted desert and uninhabitable.

Our knowledge of the interior of A. is still very imperfect in detail. The largest portion of it lies in that great desert zone which stretches from the shores of the Atlantic to those of the Northern Pacific. Nejd, the highland or central plateau of A., is a compact settled district, culminating in the crescent-shaped Jebel Toweyk, intersected by numerous

valleys, roaring torrents during the rains, but dry depressions at other times, North of Nejd, and separated from it by a narrow arm of Nefud, or the n. desert of A., is the smaller plateau of Jebel Shomer, crossed by the ranges of Jebel Aja and Jebel Selma. The n. desert, partly stony, and partly a burning expanse of red sand, is thinly sprinkled over with oases of wells and grass, serving as halting-places for the caravans of merchants or pilgrims. The oasis of *Jauf*, 60 m. long by 10 m. broad, contains three flourishing villages. *Dahna*, the s. and main desert of A., extends from Nejd and the Hadramaut coast range, and has never been explored by any European. It is, however, an almost absolutely sterile sand-waste. See MUSCAT: ZANZIBAR.

Politically, Hedjaz, Yemen, and El Hasa are really three Turkish provinces; the Sinaitic Peninsula is in Egyptian hands; England exercises much influence in Hadramaut through her possession of Aden; the sultan of Oman is practically independent, and in alliance with England; Nejd, the seat of the once powerful Wahabi State (see WAHABIS), may be said to be independent, though the emir of Shomer or Shammar, its most powerful potentate, pays a small annual tribute to the sherif of Mecca, in recognition of Turkish supremacy.

A. has, on the whole, an African climate. Though surrounded on three sides by the sea, its chains of hills exclude in a great measure the modifying influence of currents of air from the ocean. In several parts of A. hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown: in other sultry districts, the date-palm is almost the only proof of vegetable life. Over large sterile tracts hangs a sky of almost unbroken serenity. The short rainy season which occurs on the w. coast, during the summer months in England and the United States, fills periodically the *wadis* (hollow places) with water, while slight frosts mark the winters in the centre and n.e. During the hot season, the Simoom (q.v.) blows, but only in the n. part of the land. The terraced districts are more favorable to culture, and produce wheat, barley, millet, palms, tobacco, indigo, cotton, sugar, tamarinds, excellent coffee, senna, and many aromatic and spice plants, as balsam, aloe, myrrh, frankincense, etc. A. is destitute of forests, but has vast stretches of desert grass fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product both of A. and Africa.

In the animal kingdom, an African character prevails generally. Sheep, goats, and oxen satisfy the immediate domestic and personal necessities of the inhabitants, to whom the camel and horse are trusty companions in their far wanderings. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, where flights of locusts often make sad devastation. Fish and turtle abound on the coast. The noble breed of Arabian horses has been cultivated for several thousand years; but the most characteristic of all animals in

the peninsula is the camel, which has been both poetically and justly styled "the ship of the desert.' It may be regarded as an Arabian animal, for it seems to be proved that it is not a native of Africa, but has migrated from the peninsula with its master. The camel is not found among the figures of animals in the ancient Egyptian paintings on walls, nor does it appear to have been known to the Carthaginians. The breed of Oman is celebrated for its beauty and swiftness. Among the minerals of A. are iron, copper, lead, coal, basalt, and asphaltum, and the precious stones, emerald, carnelian, agate, and onyx. Pearls are found in the Persian Gulf.

But the most interesting feature of the peninsula is its ancient and peculiar population. The Arab is of medium stature, muscular make, and brown complexion. Earnestness and lofty pride look out of his glowing eyes; by nature he is quick, sharp-witted, imaginative, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of sanguinary revenge and rapacity. His wife keeps the house and educates the children.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouins, who have, however, their allotted winter and summer camping grounds, and a strong home-feeling, entertain notions of the rights of property differing seriously from those regulating the West, yet even their most marauding tribes are not without a traditional code of law and honor. The settled tribes, styled Hadesi and Fellahs, are despised by the Bedouins, who, breathing a pure air, and living on a simple diet, are physically and morally their superiors. Arabia 'is the anti-industrial central point in the world;' for here centuries pass away without any improvement save what has been introduced, almost compulsorily, by foreigners. The export of coffee, dates, figs, spices, and drugs, though still considerable, is said to be only a shadow of the old commerce which existed before the circumnavigation of Africa, or when Aden was in its prime, and the Red Sea was the great commercial route. A. has few manufactures, but carries on a transit-trade in foreign fabrics, besides importing these to some extent for its own necessities. Education is mostly confined to that within the household, where, however, a boy is instructed in reading and writing, in grammar, history, and poetry, and where he is trained to habits of politeness and self-restraint. In the few higher public schools, writing, grammar, and rhetoric compose the whole curriculum. The government is patriarchal, and the chief men of the various tribes have the title of Emir, Sheik, or Imaum. Their function appears limited to leading the troops in the time of war, to levying tribute, and to the administration of justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been unfrequent both in early and modern times.

History.—The history of A. before the time of Mohammed is involved in mystery, and has little interest, on account of its want of connection with the world's general

progress. As indicative of the African origin of the Arabs, the following particulars have been specified: the writings *Hamasa* and *Kitab el aghanee,* which represent the 'pure' Arabs as having first settled on the extreme s.w. of the peninsula, thence spreading n. and e.; the name Himyar (dusky) which is applied to the ruling class, sometimes to the entire nation; the Himyaric tongue, which, as preserved in some proper names, etc., shows decided African affinities; the kinship between the pre-Islamitic institutions of Yemen and those of the historic Egyptians, and even of the modern Abyssinians; the African bearing of the physique and manners of the pure-blooded Arabs; the facility of marriage between the s. Arabs and the Africans, and the fecundity of such unions. The earliest trustworthy records present to us an Arabia of different kingdoms and federal governments, clustered round the desert interior, and all more or less under the rule of a race of southern origin. Yemen,(q.v.)most prosperous of these, must, as the fragmentary native records which have come down to our time attest, have enjoyed a considerable degree of civilization, with an extensive commerce, a poetic literature, and practical arts; its institutions showing some affinity to those of the Nile Valley, on the other side of the Red Sea. The Himyaritic dynasty long ruled in Yemen; and *Himyaritic* is still used of the relics of the oldest s. Arabian tongue. Hira, in the n.e. prov. of Arabian Irak, on the other hand, assimilated somewhat to the neighboring Persia; Ghassan, in the n.w., approaching more to a Byzantine complexion. In the 5th c. we find the Koreyah clan, from which Mohammed (q.v.) sprung, predominating in A., and masters of the sacred shrine of Káabeh within the precincts of Mecca, a possession giving them not only a religious pre-eminence in the peninsula, but the disposal of the accumulated offerings of gold, silver, jewels, etc., in the temple, a fund of wealth which they increased by commerce on the Red Sea coast. In the pre-Islamite times, too, was held the great annual fair of Okad, in a plain of the same name, and at a day's journey from Mecca; a fair at which horse races, gymnastic sports, poetic contests, and other amusements enlivened the seriousness of trade transactions. In the reign of Augustus, Ælius Gallus, the Roman prefect of Egypt, at the head of a large army, unsuccessfully attempted the reduction of Yemen to the Roman empire. In 529, however, Yemen was conquered by a large Abyssinian army, and was kept in subjection to the Ethiopians for 76 years. Christianity found an early entrance into Arabia. The Jews, in considerable numbers, migrated into A. after the destruction of Jerusalem, and made many proselytes, especially in Yemen. This diversity of creeds in the peninsula was favorable to the introduction of the doctrine of Mohammed, which forms the grand epoch in Arabian history, and brings it into close connection with the general history of civilization. Now, for the first time, the people of A. became united under one sceptre and one creed, and powerful enough to erect new empires in three quarters of the world; in Palestine, Mesopotamia, and Persia; in Egypt and the n. of Africa; in Spain. The dominion

of the Arabs, from the time of Mohammed to the fall of the Caliphate of Bagdad, 1258, or even to the expulsion of the Moors from Spain, 1492, is an important period in the history of civilization. See MOORS: CALIPH. Then followed the subjugation of Yemen by the Turks in the 16th c.; their expulsion in the 17th c.; the dominion of the Portuguese over Muscat, 1508-1659: the conquests of Oman, and the temporary victories gained by the Persians at the close of the 16th c.; and, lastly, the appearance of the Wahabis (q.v.), 1770. The progress of the latter was interrupted by Mehemet Ali (q.v.), the pasha of Egypt, who subjugated the coast country of Hedjaz, with some parts of the coast of Yemen. The events of the year 1840, in Syria, compelled Mehemet, however, to resign all claims upon the territories lying beyond the Red Sea. Since, then, the political conditions have come to be as described above. Pop. 5,000,000.

ARA'BIAN ARCHITECTURE: usual term for Moorish or Mohammedan architecture. So inseparable is the connection between architecture and religion that it may be stated as a general rule that no sooner is a new religion engendered than it finds expression in new architectural forms. Of this, an interesting instance is in the simultaneous rise of Mohammedanism, and of the style of architecture commonly called Arabian or Moorish, but to which the name of Mohammedan might far more appropriately be given, seeing that it has everywhere followed the religion of the Crescent, and that the Arabians previously had no architecture peculiar to themselves. It is further remarkable that this style seems to have arisen undesignedly, or without conscious effort on the part of the people among whom it first appeared. The followers of the Prophet contemplated nothing peculiar in their ecclesiastical structures; and at first their mosques were built by Christian architects from Constantinople. As a natural consequence, they resembled Byzantine churches modified, in the countries of which the Moors successively possessed themselves, by the features of the existing churches. Gradually the new and fanciful ornamentation known as Arabesque (q.v.) was added to the recognized features of Greek and Roman edifices. The exclusion of animal figures, which their abhorrence of the very appearance of idolatry necessitated, confined the Mohammedan artists to the imitation of vegetable productions, varied by geometrical patterns and inscriptions, of which the letters were woven into forms suited for architectural uses. But the most original feature in their edifices, and that by which they have continued to be marked from all others, is the horse-shoe arch. It is said that the pointed arch is to be found in Mohammedan buildings as early as 780, whereas the earliest examples of its use in Christian architecture belong to the 12th c. Moorish architecture probably reached its highest point of development in the Alhambra.

ARABIAN GULF: see RED SEA.

ARABIAN NIGHTS' ENTERTAINMENTS.

ARABIAN NIGHTS' ENTERTAINMENTS: a collection of Oriental tales, first made known to Europe by Antony Galland, a French orientalist, under the title of *The Thousand and One Nights, Arabian Stories, Translated into French;* pub. Paris, 12 vols. 12mo, 1704–17, and received by many as the production of the genius of the translator himself, rather than the collection of *an unknown Arabian author*, as Galland had stated in his dedication. Oriental scholars did not hesitate at first to declare against their authenticity, and denounce them as forgeries. Having taken only an obscure place in the literature of the East, and their style unfitting them from being classed among models of eloquence or taste—having no object of a religious, moral, or philosophical kind in view, while the manners and customs delineated in them were different from all received ideas of those of the Moslem nations—their success took the critics by surprise. The work became highly esteemed by the public; it filled Europe with its fame; it had abundance of readers, and no lack of editors. Few books have been translated into so many different languages, and given delight to so large a number of readers. It may be said that, in these oriental tales, there has sprung up a new branch of literature, for their influence on the literature of the present day is easily discernible. Here are found, depicted with much simplicity and great effect, the scenes of the town-life of the Moslem. The prowess of the Arab knight, his passion for adventure, his dexterity, his love and his revenge, the craft of his wives, the hypocrisy of his priests, and the corruptibility of his judges, all are dramatically delineated—far more vividly represented, in fact, than is possible in a book of travels; while gilded palaces, charming women, lovely gardens, and exquisite repasts captivate the senses of the reader, and transport him to the land of wonder and enjoyment. Besides entertaining the mind with the kaleidoscopic wonders of a teeming and luxurious fancy, which is their most obvious merit, they present a treasure of instruction upon life in general, and oriental life in particular. And this is undeniable, notwithstanding the fact that the aspects of society they depict are far from high in the social scale, either as to civilization or morality. In them no story is to be found that will rank in morality with the story of Joseph and his brethren, simply because the Moslem faith will not admit of that, any more than the decline of Arab civilization at the time the tales must have been originally promulgated. Indeed, Galland, the first translator, having a conviction of a demoralizing tendency of this kind, avoided giving several objectionable parts of some of the stories. The thread of the narrative in these entertainments is generally simple and clear, often leading into the departments of fable, and occasionally into the regions of the supernatural and the domains of popular superstition. The tales, even when long, are not tire-

some; for they consist of shorter stories branching off from the main one, or rather encased within it, the smaller within the larger, and perhaps a smaller within that, like the little boxes used by conjurors.

For many years all doubt as to the authenticity of *The Thousand and One Nights* has been dispelled. Several MS. copies have been found, and no less than four editions of the Arabic text have been published. A more thorough acquaintance with mediæval and modern Arab life has proved the genuineness of the stories, and the truthfulness of their general representation of the mind of the Moslem. In them there are evident signs of a declension from a refined and superior civilization; the marvellous and supernatural is predominant; despotism in all its forms is manifest; and a prevalent falsity and insincerity of character visible, not only in the narrative, but in the tone of common conversation, replete as it is with oaths and asseverations.

The origin of the work—where and by whom written—is still involved in mystery. According to some, the tales are susceptible of a threefold division. The most beautiful, and in fancy the richest, appear to have come from India, the cradle of story and fable; the tender, and often sentimental, love-tales seem of Persian origin; while the masterly pictures of life, and the witty anecdotes, claim to be the product of Arabia. Throughout, however, everything is conformable to the character and customs of the town population of Arabia, and to the Mohammedan faith.

Galland's French edition was speedily translated into all the languages of Europe; edition following edition with great rapidity, some of them with enlargements, and others with modifications. A new English translation from the Arabic appeared in 1839 (new issue, edited by S. Lane Poole, 1882). It was the work of E. W. Lane, a gentleman whose long residence in Egypt enabled him to acquire so thorough a knowledge of the language, manners, and customs of the Egyptian Arabs, as furnished not only a superior version, but a series of notes embodying a portraiture of Egypto-Arabian life at once faithful and vivid. A complete translation by Payne was pub. by the Villon Society (9 vols. 1882–84); and in 1885 Captain Burton began to issue his complete translation (10 vols.).

The popularity of this wonderful book has given rise to hundreds of imitations. Among the best of the French are—*Les Mille et Un Jours, Mille et Une Quart d'Heures,* and the *Contes d' un Endormeur;* perhaps the best of the English imitations is the *Tales of the Genii,* by Sir Charles Morell; while the best of the German appears to be one from the Perso-Arabic, the *Faraj bâd el Shidda* (Joy after Sorrow), a popular work, and repeatedly published.

ARABIAN NUMERALS, or CIPHERS: the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Properly they should be styled Hindu or Indian Numerals, for the Arabs borrowed them,

along with the decimal system of notation, from the Hindus. According to one account, Gerbert (afterwards Sylvester II.) learned the use of them from the Moors in Spain in the 10th c.; others think it more probable that Leonardo of Pisa (see ALGEBRA) first introduced them from the east into Italy abt. 1202. Yet the use of them was long in making its way, and was not general before the invention of printing. Accounts continued to be kept in Roman numerals up to the 16th c. See NUMERALS: NUMERATION.

ARABIAN SEA, anciently *Mare Erythræum*, or the *Red Sea*: bay of the Indian Ocean, between India on the e. and Arabia on the w. Its northern boundary is Beloochistan; while its natural and convenient limit on the s. is a line drawn from Cape Comorin in Hindustan to Cape Guardafui in Africa, and thence continued along the coast to the Strait of Bab-el-Mandeb. In e. long. it extends from 43° 32′ at Cape Bab-el-Mandeb, to 77° 30′ at Cape Comorin; and in n. lat. from 8° 5′ at Cape Comorin, to abt. 26° at the s.w. point of Beloochistan. Including its two great arms, the Red Sea proper and the Persian Gulf, it stretches far both n. and w. The A. S. long occupied a most prominent place in the commerce of the world—a place which, after having lost it for more than 300 years through the doubling of the Cape of Good Hope in 1497, it has lately in a great measure regained, since the opening of the Suez Canal in 1869.

In the history of navigation, also, the A. S. proper is specially entitled to notice. It was along its n. shores that Nearchus, admiral of Alexander of Macedon, conducted the first well-authenticated voyage, on a large scale, of exploration and discovery; and across it the trade-winds, blowing alternately from the n.e. and s.w., were wont to waft the Greeks of Egypt, without either chart or compass, about the commencement of the Christian era. See SUEZ CANAL.

ARABIC LANGUAGE AND LITERATURE form an independent group of the South Semitic branch of the Semitic languages. Regarding the earliest literary culture among the Arabs our information is still too fragmentary for systematic treatment. But recent investigations of Glaser, Hommel, Weber, and Winckler make it certain that a high degree of literary culture had been attained fully a thousand years before the time of Mohammed. It is now a generally accepted belief among Semitic scholars that Arabia was the source of a number of great Semitic migrations which overwhelmed and conquered the kingdoms of Western Asia from the Nile to the Euphrates. The Sumerians, who had wrought out an independent civilization of a high order, probably were conquered by these Arabic hordes before 5,000 B.C. The conquerors then adopted the superior culture of the conquered, and developed the type of Semitic civilization known as the Babylonian.

Extant Arabic literature begins about a century before

Mohammed with a group of poems termed the Mo'allakat, i.e., 'The Suspended.' According to a late tradition they were so named from the practice of suspending poems on the walls of the Kaaba during poetical contests. This constituted an act of challenge to critics and rivals. The poet who succeeded in establishing his superiority was privileged to leave his poems suspended in the temple. It appears that poems so distinguished were written on byssus with golden letters, and so were also called Mudsahhabat, i.e., 'The Golden.' During the great fairs at Okaz and Mecca poetic contests were held in much the same manner as at the games of ancient Greece. The exploits of heroes and the charms of beautiful women were the favorite themes of the pre-Mohammedan poets —masters of a wild and vigorous minstrelsy, such as the free and adventurous life of the desert might be expected to foster. Their work exerted a strong influence upon the subsequent development of Arabic literature and in many respects represents the highest pitch of the Arabic poetic imagination. The most famous of the earlier poets were Nabegha, Amrilkais, Tarafa, Soheir, Lebid, Antara, Amr ibn Kulthum, and Harith.

A new era in Arabic literature was inaugurated by Mohammed (571–632). The naturally adventurous spirit of the Arabs found suitable excitement in the half-religious, half-military system of the prophet; and, after his death, their fanaticism sufficiently accounts for their subsequent career. Like an overwhelming torrent they passed over the neighboring states, and, in the short space of 80 years from the death of Mohammed, had extended their dominion from Egypt to India, and from Lisbon to Samarcand. This period of conquest was not favorable to the growth of culture. The religious element introduced by the Koran hindered rather than aided the free development of poetry. Under the Ommiade dynasty, however, flourished a number of distinguished poets who perpetuated the spirit of pre-Islamic poesy. The famous writer of erotic verse, Omar ibn abi Rebi'a, belongs to this period. Through their intercourse with civilized nations the Arabic conquerors soon yielded to the humanizing influence of letters. During the reign of the Abassides, literature, arts, and sciences were generously fostered, first during the rule of al-Mansur (754-775), and afterward under the famous Harun-al-Raschid (786-808). There was a renascence of poetical art, also, but it begins to show the influence of court life and of Persian models. Learned men were invited from many countries and remunerated for their labors in a princely manner. The works of Greek, Syriac, Old-Persian, and Indian writers were translated into Arabic. Excellent schools of philosophy were founded at Bagdad, Cordova, Cairo, Basra, Bokhara, and Kufa. Cordova soon rivalled Bagdad as a centre of learning, and many pupils from European countries began to repair to Spain in order to study mathematics and medicine under the Arabs. There were, moreover, 14

academies, with many preparatory and upper schools in Spain, and five very considerable libraries; that of Caliph Hakem is said to have contained more than 600,000 works.

Considering this state of culture it is not surprising to find that Arab scholars made important advances in geography, history, philosophy, medicine, physics, and mathematics. Such Arabic words as alcohol, algebra, alembic, azimuth, nadir, zenith, together with many names of stars, have remained in our vocabulary as indications of their influence on the early intellectual culture of Europe. Geography owes most to them during the middle ages. In Africa and Asia the boundaries of geographical science were extended. Among the leading writers of geography and travel are Ibn Hisham, Khurdadhba, Ahmad ibn Fadlan (921), Abu Ishak al-Istakhri (10th c.), Yakut (1178), Ibn Batuta, the traveller (1377), and Abu al-Fida (1331).

History in the form of chronicles began to be cultivated very early by Mohammedan writers. The influence of Persian historiography and a compelling religious interest in the prophet and his times provided an additional stimulus. The oldest Arabic historian now known is Mohammed ibn Ishak (d. 768) whose life of the prophet, revised by Ibn Isham (d. 834), still is an indispensable source on the subject. During and after the 10th c. history became a favorite study of the Arabs. Tábari, a Persian, was the first to attempt a universal history beginning with the creation. Two centuries later (c.1200) Ibn al-Athir wrote a similar work. Other historians of note are al-Masudi (956), al-Beruni (973–1048) (tr. by Sachau, Leipzig, 1878), Abu al-Fida, and Ibn Khaldun (1406), who was the first to write a philosophy of history. Histories of Spain were written by Ahmad al-Dhabbi (1195), al-Abbar, al-Makkari, and others. Among the noted historians of Egypt were abd al-Latif (1231), and al-Makrisi (1441). A characteristic product of Arabic historiography are the very numerous local histories and biographical monographs, of which al-Suyuti alone is said to have written more than 500. For extended notices the student of Arabic literature is referred to the translations of Quatremère, Dozy, and especially Wüstenfeld, *Die Geschichtsschreiber der Araber* (Göttingen, 1882). The Egyptian historian Jabarti (d. 1822) continued Makrisi's 'Chitat' into the 19th c. (tr. into French, 1888–89; also into German). See also Zenker's *Bibliotheca Orientalis* (Leipzig, 1846, for printed books), Codera y Zaydin's *Bibliotheca arabico-hispana* (recent), and Brockelmann's *Die Literaturen des Ostens in Einzeldarstellungen*, vol. vi. (1901).

Arabic theology and jurisprudence—necessarily connected because both are founded on the Koran—form the bulk of Arabic literature. They are a great complex, the outgrowth of widely differing schools of interpretation

which sprang up soon after the death of the prophet. An enormous number of sects inevitably arose. See MOHAMMEDAN SECTS. The four orthodox sects, also known as the Sunnites (fr. Sunna-tradition), are (1) the Hanefites, who subordinate tradition to reason; (2) the Schafiites, who reject reason and philosophy in their treatment of theology; (3) the Hanbalites, who admit reason where tradition is silent; (4) the Malichites, who admit reason in the same way as the Hanbalites, but lay special stress on the purity of tradition. Bochari is the most famous among the gatherers of tradition. Of the 72 heretical sects Sharistani (edited by Cureton, London, 1846) has given a valuable account. Among them the Schiites, still ruling in Persia, have attained the widest distribution. The interpretation of the Koran constitutes the principal part of education in theological jurisprudence. The most celebrated commentators are Tábari (d. 923), Samachschari (d. 1143), Fakhr al-Din Razi (d. 1209), and Baidhawi (d. 1286). The conquest of Algeria rendered the study of Arabic, or Mohammedan, law indispensable to the French. As a result many of the earliest and most important works on that subject appeared in French, such as *Précis de Jurisprudence Musulmane, selon le Rite Maléchite par Khalil-Ibn-Ishak* (tr. by Perron, Paris, 1848), *Précis de Jurisprudence Musulmane* (tr. by Keijzer, Leyden, 1859), *Droit musulman* par Sautayra et Cherbonneau (1873), and *Mohammedanisches Recht nach schafiitischer Lehre* (Stuttgart, 1897).

In philosophy the Arabs were the pupils of Greek philosophers, especially Aristotle, whose writings became known in Spain, and subsequently in all Western Europe, through translation from Arabic into Latin. The Arabic translations were made chiefly during the reign of the Abassides. Special attention was paid to logic and metaphysics. In the former science they made some independent advances in the direction of simplification, but their work is chiefly of a derivative character. Among the most famous of the Arabic philosophers are al-Kindi of Basra (beginning of 9th c.), al-Farabi (c. 960), Ibn Sina (Avicenna, c. 1000), al-Ghazzali (1111), and Ibn Roshd (Averroes, d. 1198), whose works, translated into Latin, were studied for many centuries in European universities. For further particulars the student is referred to the following works: Renan's *Averroes et l'Averroisme* (1850); Dugat's *Histoire des philosophes et des théologiens musulmans* (Paris, 1879); Dieterici's *Die Philosophie der Araber im X. Jahrhundert* (Leipzig, 1876–78); de Boer's *Geschichte der Philosophie im Islam* (Stuttgart, 1901).

In medicine, also, the Arabs acquired fame. During the 8th c. the works of Galen, Hippocrates, and others, were translated into Arabic. The earliest physicians known to us among the Arabs were Syrians and Persians. The famous translator and commentator of Galen, Honain

ibn Ishak (d. 873), laid the foundations for an Arabic science of medicine. It is not surprising, therefore, that Arab physicians followed Galen in therapeutics. Among them Rasi was the most learned, and Ibn Sina (Avicenna) the most famous. The Koran forbade the dissection of human bodies, hence no progress was made in anatomy. Botany was studied chiefly for medicinal purposes. Starting with the work of Dioscorides they enlarged the science considerably. In pharmaceutical chemistry they made their greatest advances. They knew how to obtain mercurial salts through the action of acids upon quicksilver and employed them in the preparation of salves. They knew formic acid, succeeded in purifying borax, and distilled alcohol from sugar and rice. For details see Leclerc, *Histoire de la médecine arabe* (Paris, 1876; uncritical, but still useful); Wüstenfeld, *Geschichte der arabischen Aerzte* (Göttingen, 1840); and Wiedemann, *Ueber die Naturwissenschaften bei den Arabern* (Hamburg, 1890).

The Arabs became very proficient mathematicians. The so-called Arabic numerals they seem to have derived from India. Their use of them led to the introduction of this mode of notation into Europe. In trigonometry they established the use of the sine instead of the chord, and made a more extended application of algebra. Astronomy, among the mathematical sciences, flourished most. In the 9th c. the three sons of the librarian Musa ibn Shakr calculated accurately the diameter of the earth and the precession of the equinoxes. Al-Battani is said to have introduced trigonometrical functions, and to have observed the advance of the line of apsides in the earth's orbit. For a fuller treatment of this subject see Suter, *Die Mathematiker und Astronomen der Araber* (Leipzig, 1900).

Besides these advances in the solid branches of knowledge the genius of the Arabs continually flowered into poetry. The civil dissensions of the earlier period and the tyranny of the Abassides were not favorable to the Muses. Later the stimulus of contact with Persian and Greek minds gave rise to a new and brilliant school of poets. Their verse was not the simple and spontaneous minstrelsy of a nomadic people. It allied itself with the prevailing culture and reached, especially during the golden period of Arabic civilization, a highly artistic form. Among the pioneers of this new era was Abu-Teman, the compiler of the celebrated anthology known as the 'Hamasa.' Mutanabbi, his successor, is by many still esteemed the greatest of Arab poets. Scarcely less prominent are Abu-Nuwas of the court of Harun al-Raschid, al-Tughrai (c. 1100; said to have furnished Tennyson with the model of his 'Locksley Hall'), and al-Busiri (1279), the panegyrist of Mohammed. Hamadani (1007) invented a new style of verse called 'Makāmāt', a kind of rhymed prose, which was brought to its highest perfection by Hariri (1121). In Egypt Ibn Faridh com-

posed 'the mystico-erotic volume that has never in its kind been surpassed by the poets of any land'. At the same time a singularly fantastic prose literature arose, in which the craving for the gorgeous and wonderful, so characteristic of the adventure-loving Arabs, was fully gratified. Here Persia was again called upon to make its contribution, as in the *Fables of Bidpai*, translated by Mukaffa in 750. Most famous among the legendary tales and romances are *The Arabian Nights' Entertainments*, the *Antar Romance*, the stories of the *Banu Hilal*, of *al-Zir*, *Barakat*, etc. This romance literature exercised a powerful influence upon the chivalry and the writers of mediæval Europe.

All this intellectual vigor of the earlier centuries of Mohammedanism presents a strong contrast to the mental decrepitude which has prevailed since the ascendancy of the Turks in the 16th c. Of literature there is little to record beyond scholastic discussions on dogmatics and jurisprudence, and tedious grammatical disquisitions. A few modern writers have attempted, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabbagh of Syria (*La Colombe Messagère*, Arabic and French, Paris, 1805); the Sheik Rifaa of Cairo (*The Broken Lyre*, Paris, 1827; *Manners and Customs of Europeans*, Cairo, 1834); and the poet Mohammed Uthman Jalal (b. 1829), translator of Racine and Molière. American missionaries, at Beirut and other places, are doing much to stimulate literary interests by the establishment of schools and printing presses. But very little creative work is being done in Arabic at present. The eyes of such writers as deserve mention are turned toward the past. Among them are Khalil Sarkis, the historian of Jerusalem; al-Shidyak, the grammarian; Butrus al-Bistani (1819-1883), the author of a dictionary and general encyclopedia; and Louis Cheikho, the learned editor of the old Arabic poets.

Arabic Language: of all languages the Arabic is the most logical in structure. As to content it is at once rich and poor. Necessarily destitute of innumerable words describing ideas and objects which only a highly civilized life can develop, it on the other hand is remarkably rich in synonyms. These the nimble fancy of the Arabs multiplied to such an extent that in some cases several hundreds of expressions are found for the same thing. It seems a futile endeavor to get back to the proto-Semitic tongue that lies behind the Semitic family of languages. But it is generally conceded now that the Arabic has preserved the oldest grammatical forms, although the oldest writings are found in the Assyrio-Babylonian inscriptions. The classical literary language of the Arabs belongs to the South Semitic, or Arabic, branch of the Semitic languages. To be classed with it are the modern vulgar Arabic, spoken in many Mohammedan countries, the older southern Arabic preserved

in the Sabaean inscriptions (less correctly called Himyaritic), and its offshoot, the Ge'ez, or Ethiopic, in Abyssinia. The vulgar Arabic may be subdivided into the following chief dialects: a) of Syria, b) of Mesopotamia, c) of Egypt, d) of Tunis and Morocco, e) of Malta, f) of Oman and Zanzibar, g) of the Mehri in South Arabia, h) of parts of the Philippine Islands. Arab grammar and rhetoric were from the earliest times considered an indispensable item of a respectable education. One of the earliest Arabic grammarians was Abul-Aswad al-Duli, who lived under the caliph Ali. Al-Ferahidi of Basra was the first great prosodist and metrician. Al-Jauhari, who died in 1009, compiled a dictionary of the pure Arabic speech, entitling it al-Sāhāh, i.e., 'Purity.' This dictionary still is of inestimable value. Al-Firuzabadi (d. 1414) became the author of an Arabic Thesaurus called al-Kamus —'The Ocean,' (Calcutta, 1817). This is the best lexicon in Arabic and has been translated into Persian and Turkish. Jordshani has explained in alphabetical order the meaning of the technical terms used in Arabic art and science. His work was published by Flügel (Leipzig, 1845) under the title *Definitiones*. Maidani made a large collection of Arabic sayings, proverbs, etc., which was published by Freytag (Bonn, 1838–43). Through the conquests of the Arabs in Sicily and Spain their language became known in Europe. Notwithstanding the numerous traces of its influence in various European tongues it became a forgotten language again after the expulsion of the Moors from Spain. Dutch scholars were the first to enter into a serious study of the language in the 17th c. Thereafter it was rapidly taken up by German, French, and English scholars. Now a knowledge of the language is considered an indispensable part of a learned theological education. A casual glance at a Hebrew lexicon shows how necessary Arabic is in the study of Hebrew. Its lexical richness and the stability of its linguistic forms enables the Semitic scholar to supply meanings which have become lost in other languages of the same family. The grammars of Wright, Socin, and de Goeje are among the best. The standard lexicon (Arabic-English) is that of E. W. Lane, (London, 1863–1893). A good dictionary of modern Arabic is that of Wahrmund, *Neu-arabisches Handworterbuch* (Giessen, 1870). A very useful bibliography will be found in Socin's *Arabic Grammar*.

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ARABIC WRITING: like most Semitic writing this proceeds from right to left. It is borrowed from the old Syriac, and was probably introduced into Arabia by Christian missionaries about the time of Mohammed. In its oldest form it is called Kufic, from the town of Kufa, on the Euphrates, where the transcription of the Koran was busily carried on. It has particular symbols for only 16 of the 28 Arabic consonants. This writing, nevertheless, continued to be employed for 300 years, and for coins and inscriptions even later. But in the 10th c. it was displaced for common purposes by a cursive handwriting, the *Neshki*, introduced by Ibn Mokla. It has 28 letters, all of them consonants. The vowels are indicated by signs written above and below the consonants. Before the introduction of vowel signs the weak consonants were used as vowel-letters.

ARABIN, n. *ăr′ā-bĭn* [formed from *Arabic*]: the soluble gummy principle of gum arabic (q.v.): $C_{12}H_{22}O_{11}$, isomeric with cane-sugar; obtained pure by adding alcohol to a solution of gum-arabic in water, when the A. is precipitated in white flocculi.

ARABI PASHA: see EGYPT.

ARABLE, a. *ăr′ă-bl* [F. *arable*—from L. *arabĭlis*—from L. *aro;* Gr. *arŏō′*, I plow]: land that can be plowed or cultivated.

ARACAN, or ARRACAN, or MRO-HOUNG [Old Town]: city of British Burmah; formerly cap. of the prov. of A.; about 50 m. from the sea; lat. 20° 42′ n., long. 93° 24′ e. Lying in a swampy valley which, on almost every side, is confined by hills, A. is subject to febrile disease in all its forms. Previous to the first Burmese war—the occasion which

brought it under British dominion—it is said to have contained 18,000 houses; but in 1835, after it had ceased to be the seat of government, the population had sunk to 8,000. In 1877, the inhabitants of the town hardly exceeded 2,000. The most striking memorial of antiquity is its dilapidated fort, consisting of three concentric walls such as only a powerful state could have constructed. Beyond the limits, too, of this citadel, the town, as a whole, appears to have been surrounded by a circumvallation 9 m. in length, composed partly of steep and rugged eminences and partly of artificial works. These defenses, which are believed to be several centuries old, the British carried by assault, 1825, April 1.

ARACARI, *â-râ-sâ'rĭ*, or ARICARI (*Pteroglossus*): genus of birds closely allied to the Toucans (see TOUCAN), and differing from them chiefly in the somewhat smaller bill, which is not so thick as the head. They are generally also of smaller size, and the prevailing color of their plumage is green, often varied with brilliant red and yellow. Like the Toucans, they are natives of the warm parts of S. America.

ARA'CEÆ: see ARUM.

ARACHIS, *ăr'ă-kĭs:* genus of plants of the natural order *Leguminosæ*, sub-order *Papilionaceæ*, natives of the warm parts of America, of which the principal and, until recently, the only known species was the *A. hypogæa*, sometimes called the underground kidney-bean, and more frequently the ground-nut, or peanut. It also receives the names of earth-nut and mandubi. It is an annual plant, with hairy pinnate leaves, which have four leaflets. The flowers are yellow, the standard veined with red. After flowering, the flower-stalks elongate and bend toward the earth, into which the pods penetaate, ripening underground. The seeds are in some countries a principal article of food; but the importance of the plant is due chieffy to the fixed oil in the seeds, similar to olive oil or almond oil. It is cultivated in all warm regions of the world. The root is used sometimes as a substitute for licorice. See PEANUT.

ARACHNIDA, *ă-răk'nĭ-dă*, or ARACHNIDES: sub-class of *Tracheate Arthropoda* (q.v. under ARTICULATA), including scorpions, spiders, mites, etc., and first separated by Lamarck from the *Insecta* of Linnæus. The body is usually divided into cephalo-thorax and abdomen, the latter destitute of appendages, the former possessing six pairs, of which the posterior four pairs are walking limbs, thus furnishing a ready means of distinction from insecta, which have three pairs only. The two anterior pairs known as cheliceræ and pedipalpi are of various forms, the former usually chelate or sub-chelate; the latter chelate, ambulatory, or antenniform. Respiration is effected by means of tracheal tubes, or by pouches—the so-called respiratory sacs.

Those A. with segmented abdomen are termed *Arthrogastra*, or *Pedipalpi;* families five of which *Scorpio*, *Thelyphonus*, *Chelifer*, *Galeodes*, and *Phalangium* are types. These show a distinct gradation to true spiders or *Araneina*, which are easily recognized by their unsegmented abdomen usually furnished with spinning-glands, opening by four to

six posterior papillæ, and by their sub-chelate cheliceræ and ambulatory pedipalpi. The mites and ticks (*Acarina*) have the unsegmented abdomen, continuous with the thorax, and the cheliceræ and pedipalpi are modified into a sucking or piercing apparatus. The *Linguatulida* (*Pentastomum*), the *Tardigrada*, and the *Pycnogonida*, have usually been reckoned as highly modified A., somewhat akin to the *Acarina;* the most recent anatomists, however, tend to remove them from the A. altogether. On the other hand, it has lately been clearly shown that the Silurian *Eurypterida*, and the ancient, but still persistent *Limulus* (see KING-CRAB), are as closely allied to A. as to the Crustaceans, and thus the two great divisions of the Arthropoda, the Tracheata and the Branchiata, appear to have diverged in palæozoic times.

ARACHNOID, n. *ă-răk'noyd* [Gr. *arachnē*, a spider; *eidos*, form]: in *anat.*, the serous membrane covering the brain, and lying between the *piamater* and *duramater:* ADJ. in *bot.*, having fine hairs so entangled as to resemble a cobweb; spider-web-like. ARACHNIDA, n. plu. *ă-răk'nĭ-dă*, or ARACH'NIDANS, n. plu. *-nĭd-ănz* [see IDÆ, postfix]: a class of articulata, comprising spiders, mites, and scorpions. ARACHNITIS, n. *ăr'ăk-nī'tĭs*, inflammation of the arachnoid membrane.

ARACHNOID MEMBRANE, *ă-răk'noid:* one of the three coverings of the brain and spinal cord; a thin glistening, serous membrane, which by its parietal layer adheres inseparably to the duramater on its outer side, and more loosely to the piamater which is between it and the brain substance. Between the piamater and the A.M. in some situations there are considerable intervals (subarachnoid spaces); they are filled with a fluid named cerebrospinal, the presence of which is necessary to the proper action of the nervous centres. See CEREBROSPINAL FLUID: PIAMATER.

ARAD, *ŏr'ŏd:* t. in the dist. of A. in Upper Hungary; on the right bank of the Marosh, an affluent of the Theiss; and is also styled Old A. to distinguish it from New A., on the opposite side of the river. A. carries on a large trade in corn, tobacco, etc., and was at one time the greatest cattle-market in Hungary, and is even yet inferior only to Pesth and Debreczin. During the 17th c., it was often captured, and at last destroyed by the Turks. Its new fortifications, erected 1763, made A. an important position in the revolutionary war of 1849, when it was occupied for a considerable time by the Austrian general Berger, who capitulated here, July, 1849. From A. Kossuth issued his proclamation, 1849, Aug. 11, in which he expressed in impassioned terms, his despair of the Hungarian cause for the present. After the catastrophe of Világos, Aug. 17, A. was surrendered to the Russians through the treachery of Görgey. Pop. (1900) 56,260, including many Jews who are very wealthy.

NEW A., a t. in the Banat of Temesvar, contains about

6,000 inhabitants, including many Germans, who are the principal persons in the place.—The dist. or prov. of A. has 1,700 sq. m. The e. dist. is occupied by a branch-chain of the Carpathian Mts., which contain marble quarries, and mines of copper and iron; the w. is level, and produces wheat, maize and several varieties of wine, as well as abundance of fruits. The inhabitants are chiefly Wallachians. Pop. of prov. (1894) 304,813; (1901) 329,840.

ARÆOMETER: see AREMETER.

ARÆOSTYLE, n. *ă-rē'ŏ-stīl* [L. *areostylus:* Gr. *araios,* thin, narrow, with intervals; *stulos,* a pillar]: in *arch.*, a kind of intercolumniation in which the pillars are so wide apart that the intermediate spaces are each upwards of three diameters of the column. This constitutes one of the five kinds of intercolumniation described by Vitruvius: ADJ., pertaining to.

ARÆOSYSTYLE, n. *ā'rē-o-sĭs'tĭl* [Gr. *araios,* thin, narrow; *sustulos,* with columns standing close]: an arrangement in which columns are coupled; for example, in the w. front of St. Paul's Cathedral, London.

ARAFAT, *â'rȧ-fȧt'*, MOUNT, or *Jebel-er-'rahme* ['Mountain of Mercy']: a granite hill abt. 15 m. s.e. of Mecca; believed by the Mohammedans to be the spot where Adam, conducted by the angel Gabriel, met again his wife Eve, after a punitive separation of 200 years, on account of their disobedience in Paradise. It is not above 200 ft. high, but its circuit is a mile and a half. Its importance since the time of Mohammed arises from its being the scene of a yearly procession of the faithful who visit Mecca. The principal part of the religious ceremony of this pilgrimage is a sermon, the hearing of which entitles all to the name and privileges of a Hadji.

ARAGO, *âr'a-go, â-râ-gō'*, or *â-râ'go* DOMINIQUE: 1786, Feb. 26—1853, Oct. 3; b. Estagel near Perpignan, dept. of the E. Pyrenees; celebrated French astronomer and natural philosopher. At the age of 17, he entered the Polytechnic School at Paris, where the spirit, promptitude, and vivid intelligence of his answers to the questions of Legendre excited admiration. In 1804, he became sec. to the observatory at Paris. Two years afterwards, he was engaged, with Biot and others, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. A. and Biot had to extend it from Barcelona to the Balearic Isles. The two *savans* established themselves on the summit of Mount Galatza, one of the highest of the Catalonian branch of the E. Pyrenees. Here they lived for many months, communicating by signals with their Spanish collaborateurs, across the Mediterranean in the little isle of Ivica, though many a night the furious tempests destroyed their hut together with the labors of weeks. Visitors they had none, except two

Carthusian monks, who were wont to come up and spend a portion of the evening in converse with them. Before A. had completed his calculations, Biot had returned to France, and war had broken out between the two nations. A was now held to be a spy; his signals were interrupted; and with great difficulty he succeeded in making his escape to Majorca, where he voluntarily imprisoned himself in the citadel of Belver, near Palma. At last he obtained his liberty on condition of proceeding to Algiers, which he did, but was captured, on his return to France, by a Spanish cruiser, and sent to the hulks at Palamos. He was, however, liberated after a time, and sailed once more for France, but almost as he was entering the port of Marseilles, a tempest arose which drove the vessel across the Mediterranean all the way to Algiers. The former dey, to whose demands he had owed his liberation from the hulks, was dead; his successor, a ferocious tyrant, placed him on his list of slaves, and intended to employ him as interpreter. After some time, he was released at the request of the French consul, and, narrowly escaping another capture by an English frigate, finally found his way to Marseilles 1809, July. As a reward for his suffering in the cause of science, the Acad. of Sciences suspended its standing rules in his favor; and though only 23 years of age, he was elected member in the place of Lalande, who had just died, and was appointed Professor of Analytical Mathematics in the Polytechnic School. Afterwards, his attention was given more to astronomy, magnetism, galvanism, and the polarization of light. In 1811, he read a paper to the Academy, which may be considered the foundation of 'chromatic polarization.' In 1812, he commenced his extraordinary course of lectures on astronomy, etc., which fascinated all Paris—the savans, by their scientific rigor and solidity; the many, by their brilliancy of style. In 1816, with Gay Lussac, A. established the *Annales de Chimie et de Physique*, and confirmed the truth of the undulatory theory of light. In the same year he visited England for the first time, and made the acquaintance of various persons distinguished in science, especially Dr. Thomas Young. In 1818, appeared his *Recueil d'Observations géodésiques, astronomiques et physiques.* In 1820, he turned his facile and inventive genius into a new channel, and made several important discoveries in electro-magnetism. Oersted had shown that a magnetic needle was deflected by a voltaic current passing along a wire. A. pursued the investigation, and found that not only a magnetic needle, but even non-magnetic substances, such as rods of iron or steel, became subject to deflection also, exhibiting during the action of the voltaic current a positive magnetic power, which, however, ceased with the cessation of the current. Some time after, he demonstrated that a bar of copper, and other non-magnetic metals, when moved circularly, exert a noticeable influence on the magnetic needle For this discovery of the development of magnetism by rotation, he obtained, in 1825, the Copley Medal of the Royal Society of London; and in 1834, when he again visited Great Britain, especial honors

were paid to him by the friends of science in Edinburgh and Glasgow. Four years previous to this second visit to Great Britain, he had received the honor he most coveted—that of being made Perpetual Sec. of the Acad. It was while holding this office that he wrote his famous *éloges* of deceased members, the beauty of which has given him so high a place among French prose-writers. As a politician, also, his career was remarkable. He was a keen republican, and was prominent in the July revolution (1830). In the following year he was elected by Perpignan as a member of the chamber of deputies, where he occupied a position on the extreme left. In the February revolution of 1848, he was chosen a member of the provisional government, and appointed minister of war and marine. In this position he resisted the proposed measures of the socialist party, and advocated the constitution of the United States as the beau-ideal of democracy. His popularity in his own province was the means of preventing the discontented population of the E. Pyrenees from proceeding to lawless and violent measures. On the question of the presidency, A. opposed Louis Napoleon, declared himself against the policy of the new ministry, and refused to take the oath of allegiance after the *coup d'état* of 1851. Napoleon, however, made a special exception in his favor, and allowed him to retain the directorship of the observatory. His works were edited by Barral (17 vols., 1854-62), and a statute of him was erected at Perpignan in 1879.

ARAGO, Étienne: archivist in the *Ecole des Beaux Arts:* 1802, Feb. 9—1892, Mar. 6: brother of Dominique. He held an appointment under the provisional government as director-general of the post-office, in which he showed great vigor, promptitude, and sagacity, and achieved several postal reforms; was elected member of the national assembly; was compromised by the insurrection in 1848, and sentenced to exile for life. In 1859, he returned to France; and at the time of the Franco-Prussian war was mayor of Paris, resigning, 1870, November.

ARAGO, Jacques Étienne Victor: 1790-1855, Jan. 1; brother of Dominique, the great savant. In 1817, he accompanied the expedition under Freycinet in a voyage round the world. Afterwards, at Bordeaux and at Toulouse, he was engaged in several branches of light literature, industriously writing, in company with other scribes, a multitude of vaudevilles, besides publishing several poems and romances. In 1835, he undertook the management of the theatre at Rouen; but having become afflicted with blindness, he was compelled to resign this post in 1837. His early voyage round the world was the occasion of two very pleasant books of travel: *Promenade autour du Monde* (Paris, 1838); *Souvenir d'un aveugle, Voyage autour du Monde* (Paris, 1838). In 1849, though deprived of sight, he formed a company of speculators, placed himself at the head of it, and departed for California, to search for gold on a large scale. His companions mutinied, and left him, deserted and disappointed, at Valparaiso. On his return, he pub-

lished his painful experiences, under the title, *Voyage d'un aveugle en Californie et dans les Regions aurifères* (Paris, 1851).

ARAGO, JEAN: 1789-1836; brother of Dominique: was general of the republican army in Mexico, and wrote, in Spanish, a history of Mexico.

ARAGON, *ăr'a-gon:* anciently a kingdom, a captaincy-general in the n.e. of Spain; bet. 40° 2′ and 42° 54′ n. lat., and long. 2° 10′ w. and 0° 45′ e.; greatest length from n. to s., 190 m.; breadth, 130 m.; 17,900 sq. miles. It is bounded, n. by the Pyrenees, separating it from France; w., by Navarre, and Old and New Castile; s., by Valencia, and part of New Castile; and e., by Catalonia, and part of Valencia. The river Ebro, which descends from the n. heights of Old Castile, flows through the middle of A., receiving numerous tributaries both from the lofty regions of the Pyrenees and from the Sierras in the s.; of the former, the principal are: the Noguera, which forms the boundary line between A. and Catalonia, the Essera, and the Gallega; of the latter, the principal are: the Guadalope, the San Martin, and the Salon. The prov. is naturally divided into the level country, along the Ebro, and the n. mountainous district of Upper Aragon. The central plain is sterile, poorly supplied with water, and intersected by deep ravines (*barancos*). Agriculture is here confined to the raising of maize, vines, and olives; but on the sides of the Ebro, where water abounds, rice and other grains are abundantly produced; and in the valleys of upper A., the most beautiful and fertile of all the Pyrenean valleys, we find a splendid vegetation, and a soil that enables the inhabitants, in spite of the wretchedness of their agriculture, to grow considerable wheat, rye, maize, barley, etc. The climate of the prov. is various; comparatively cool in the mountain-districts, but often very sultry on the plains. Spurs of the Pyrenees strike down far into the prov., and between these ridges the rich valleys lie, some of them upwards of 20 m. long. The slopes of the hills are clothed with forests of oak, beech, and pine, and the felled timber is floated down the rivers into the Ebro, and thence down to Tortosa at its mouth. The minerals of the prov. are copper, lead, iron, salt, alum, saltpetre, coal, and amber. The manufactures are inconsiderable.

A., peopled by a brave, active, enduring, but obstinate, race, has frequently been the arena of sanguinary warfare. It early became a Roman prov.; and, on the fall of the empire, passed into the hands of the West-Goths, but was conquered by the Moors in the beginning of the 8th c. The rulers of A., after it had been recovered from the Moors, and united with Catalonia (1137), became powerful; obtained possession of the Balearic Isles in 1213; of Sicily in 1282, of Sardinia in 1326, and of Naples in 1440. By the marriage of Ferdinand with Isabella, heiress of Castile, in 1469, the two states of A. and Castile were united, and formed the foundation of the great Spanish monarchy.

After Ferdinand's death in 1516, the union of the states was made permanent. In the war with the French, 1808-9, Saragossa, the cap. of A., was remarkable for its heroic defense under Palafox; and in recent Spanish wars, the people of A. have displayed the same courage which marked their conduct on that memorable occasion. Upper A. was on the side of the queen; but Lower A. generally adhered to the party of Don Carlos. A. is now divided into three depts.—Saragossa, Teruel, and Huesca. The chief towns are Saragossa, Calatayud, Huesca, and Teruel. See SARAGOSSA, etc. Pop. 912,711.

ARAGONA, *â-râ-gō'nâ:* t. of Sicily, 8 m. n.n.e. from Girgenti. The mud-volcano Maccaluba is near the town; and there are considerable sulphur deposits. The only object of interest is the old castle of the princes of Aragona, a huge building, in the Renaissance style, which has fallen much into decay. Pop. (1901) 11,985.

ARAGONITE: see ARRAGONITE.

ARAGUATO, *âr-â-gwâ'tō* (*Mycetes ursinus*): the largest known species of new world monkeys. Its discordant yells may be heard at a mile's distance.

ARAGUAY, *â-râ-gwī':* large river of Brazil, rising in s. lat. 18° 10′ and w. long. 51° 30′. Like most of the considerable rivers of the country, it flows towards the n. After a course of about 1,000 m. to San Joao, it there joins the Tocantins, which, after a n. course of 300 m. more, mingles its estuary with that of the Amazon round the Isle of Marajo. Like most of the rivers in this part of Brazil, the A. is of difficult navigation, frequently interrupted by rapids.

ARAISE, v. *ă-rāz'* [AS. *a*, and *raise*]: in *OE.*, to raise.

ARAL, *ăr'al*, LAKE: second in size only to the Caspian Sea, in the steppes of Asia; separated from the Caspian by the plateau of Ust-Urt. It lies wholly within the limits of Russian Central Asia, between 43° 42′ and 46° 44′ n. lat., and 58° 18′ and 61° 46′ e. long. It is fed by the river Sir (the ancient Jaxartes) on the n.e. side, and the Amu (or ancient Oxus) on the s.e. It is shallow, and has no outlet. Its level is 117 ft. above that of the Caspian, and 33 ft. above that of the Black Sea. Like other lakes drained only by evaporation, it is brackish. Owing to the shallowness of its waters, navigation is difficult; but Russian steamers have been launched upon it, and took part in the operations against Khiva in 1873, June. The history of the Sea of Aral is very remarkable. Sir Henry Rawlinson and Col. Yule have recently collected references made to it in Greek, Latin, Arabic, and Persian writers, and have established the fact that its present area has been dry land twice within historical times—the Jaxartes and the Oxus then running s. of the Sea of Aral to the Caspian. This was the case during the Greco-Roman period, and again during the 13th and 14th centuries.

ARALIA, *ă-ra'lĭ-ă:* genus of plants, type of the natural order *Araliaccæ*. This order is dicotyledonous or exogenous, and consists of trees, shrubs, and herbaceous plants, resembling the *Umbelliferæ* (q.v.) both in their general habit and in their botanical characters, but differing essentially in the fruit, which is not *didymous* or formed of two separable carpels as in the *Umbelliferæ*. The fruit of the Araliaceæ consists of several one-seeded cells, often succulent. The order contains about 160 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. Poisonous qualities are not developed as in the *Umbelliferæ*. The herbage of many species affords good food for cattle, and some are used for human food. The genus Aralia contains a considerable number of species —trees, shrubs, and herbaceous plants. It has a succulent fruit, with 5 or 10 cells, crowned with the styles. *A. nudicaulis* is a native of the United States, a species of humble growth, having a solitary radical leaf with a trifid stalk and ovate serrated segments; the scape is shorter than the leaf. The root is said to be equal in value to sarsaparilla as an alterative and tonic. *A. racemosa*, *A. spinosa*, and *A. hispida*, also natives of N. America, produce an aromatic gum resin. *A. spinosa* is a stimulant diaphoretic. The berries, infused in wine or spirits, are employed as a cure for rheumatism. It is sometimes called Toothache-tree: it also bears the name of Angelica-tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 ft., with a single stem, spreading head, doubly and trebly pinnate leaves and ovate leaflets, and is very ornamental in a lawn. *A. polaris*, found in the s. island of New Zealand, and in the greatest abundance and luxuriance in Lord Auckland's Islands, is described by Dr. Hooker as a 'very magnificent plant,' a herbaceous perennial, 4–5 ft. high, with large orbicular masses of green foliage and waxy flowers, presenting a very striking appearance. *A. edulis*, now called *Dimorphanthus edulis*, is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavor, are used by the Japanese as carrots or parsnips are in Europe. Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice paper has been ascertained to be cut from cylinders of the pith of an Aralia. Ginseng (q.v.), the root of a species of Panax, is one of the most important products of the order *Araliaceæ*. The astringent roots of *Gunnera scabra*, or Panke, are used in tanning, but its fleshy leaf-stalks are eaten like those of rhubarb. It has been seen on the sandstone cliffs of Chiloe with leaves nearly 8 ft. in diameter.—*A. nudicaulis* is known as Wild Sarsaparilla see SARSAPARILLA); and *A. spinosa*, the Angelica-Tree, is known as Hercules Club, having thick branchlets. Our native Ginseng (q.v.), and Dwarf Ginseng (*A. trifolia*), with deep globular tuber, common at the north, belong here.

ARALIACEÆ, n. plu. *ă-rā'lĭ-ā'se-ē* [*aralĭă*, an American word]: the ivy family. ARALIA, n. plu. *ă-rā'lĭ-ă*, a genus of the above, one species of which has fragrant and aromatic roots, which are used in America as a substitute for sarsaparilla. ARALIACEOUS, a. *ăr-āl'ĭ-ā'shŭs*, pertaining to the Aralia.

ARALO-CASPIAN, a. *ă-rā'lō-kăs'pĭ-ăn*, or *ā'răl-ō-:* a term applied to the extensive basin or depressed area occupied by the Aral and Caspian seas and surrounding districts of country; in *geol* , applied to the limestone and associated sandy beds, of brackish-water origin, which have been traced over much more than the area indicated.

ARAM, *ā'răm*, EU'GENE: 1704–59; b. Ramsgill, Yorkshire. His father was a gardener, and could afford to keep A. at school only for a short time; but even while assisting his father, he contrived to gratify his passion for learning. At an early period of his life he married, and became a schoolmaster, first in Netherdale, and afterwards at Knaresborough, where he resided till 1745. In the town of Knaresborough lived one Daniel Clarke, a shoemaker, and an intimate acquaintance of A.'s. On one occasion Clarke happened to purchase a quantity of valuable goods, which he easily obtained on credit; but to the surprise of everybody, he soon after disappeared, and no trace of him could be discovered Suspicion lighted upon A., not as Clarke's murderer, but as his confederate in swindling the public. His garden was searched, and in it was found a portion of the goods which Clarke had purchased. A. was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough, and went to London, and other parts of England, in his capacity of schoolmaster; and in spite of his wandering life, contrived to acquire a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish, and was planning a great etymological work, to be entitled 'A Comparative Lexicon of the English, Latin, Greek, Hebrew, and Celtic Languages,' when he was suddenly dragged away from his ushership of Lynn Academy, in Norfolk, and committed to prison on a charge of murder.

In 1759, a skeleton was dug up near Knaresborough, which the inhabitants suspected to be that of Clarke, for they had now come to the conclusion that the unfortunate man had met with foul play, especially as A.'s wife had, on several occasions, made strange statements to the effect that her husband and a man named Houseman knew more of Clarke's disappearance than they chose to admit. Houseman was now confronted with a bone of the skeleton which had been discovered. He very emphatically denied that it was Clarke's. People naturally wondered how he *could* be so positive, the bones of skeletons being, to the uneducated eye, similar in appearance. They became convinced that if the skeleton was not Clarke's, Houseman must know where the latter was. At last he confessed that he had been a spectator of the murder of Clarke by A. and one Terry. He named the place where the body had been hidden. It was searched, the buried skeleton was dug up, and

A. was tried at York, for the murder of Clarke, 1759, Aug. 3. What has given extraordinary *éclat* to this trial is the fact that A. conducted his own defense. He attacked, with great acumen, plausibility, and curious erudition, the doctrine of circumstantial evidence; but to no effect, for a verdict of guilty was returned, and he was condemned to suffer death three days afterwards. In the interval, he confessed his guilt to the clergymen who attended him. While in the condemned cell, he wrote a defense of suicide; but failed in a practical illustration of the doctrine, which he forthwith attempted.

ARAMÆ'A: the whole country to the n.e. of Palestine, with boundaries, not rigorously defined, as follows: n., by Mount Taurus; e., by the Tigris; s., by Arabia; and w., by Arabia, Phœnicia, and Lebanon. It comprised the countries known to the Greeks by the various names of Syria, Babylonia, and Mesopotamia. *The Aramaic language*, a branch of the Semitic, was common to the whole country, and was divided into two principal dialects—the west Aramaic or Syriac, and the east Aramaic, or, as it is improperly termed, the Chaldee. The former was that spoken almost universally in Palestine in the time of Christ. Ever since the Babylonian captivity, the pure Hebrew, in which the whole of the Old Testament, with the exception of a few chapters in Daniel and Ezra, had been written, had gradually given place to the Aramaic. The Aramaic version of the Bible was that used in Christ's time, who quotes from it, and not from the original Hebrew; as, for instance, the beginning of Psalm xxii. repeated on the Cross. The Talmud, especially the Babylonian, has a large admixture of Aramaic elements. The Aramaic dialect is, in general, the harshest, poorest, and least elaborate of all the Semitic languages, and has now almost entirely died out, and given place to the Arabic and Persian. Indeed, it is found living only among some tribes in remote districts of the mountains of Kurdistan, and in two or three villages in Syria; yet it is considered highly probable that it is the root of the whole cluster of Semitic tongues.

ARAMAIC, a. *ăr'ă-mā'ĭk* [from *Aram*, a son of Shem, whose earliest descendants are supposed to have inhabited the upper basin of the Tigris]: a name applied to the Syro-Chaldean language—a branch or dialect of the great Semitic family of languages. ARAMEAN, or ARAMÆAN, a. *ăr'ă-mē'ăn*, pertaining to the Syrians and Chaldeans or their language.

ARANDA, *â-rân'dâ*, PEDRO PABLO ABARCA DE BOLEA, Count of: 1718–99; of a distinguished Aragonese family: entered at first on a military career; but having evinced a remarkable spirit of observation, he was appointed by Charles III. ambassador to the court of Augustus III., king of Poland; which post he filled for seven years. After his return, he was appointed capt.-gen. of Valencia, and in 1766 recalled to Madrid on account of its disturbed state, and the presidency of the council of Castile was bestowed on him. A. not only soon restored order in the capital, but

limited the power of the Inquisition, procured the expulsion of the Jesuits from Spain, and carried the salutary terror of government into the recesses of the Sierra Morena, then infested by hordes of ferocious banditti. Like many other reformers, he was not able fully to carry out his liberal intentions. In 1773, he was removed from his high position through the influence of the clergy, the Dominican monks especially, and sent as ambassador to France. Grimaldi succeeded him in his office, and after him Count Florida Blanca; but when the latter lost his office in consequence of court intrigues, A. returned to his position; soon, however, to lose it again through the agency of Godoy, Duke of Alcudia, the queen's favorite. He, however, remained president of the council of state, which he had organized; but upon his expressing his views regarding the war with France, he was banished to his native province of Aragon, where he died in 1799.

ARANEINA: see under ARANEOUS.

ARANEOUS, a. *ă-rā'nĕ ŭs* [L. *arānĕă*, a spider or cobweb]: resembling a cobweb. ARANEI A, n. *a-rā-nē-ī na* the order of the spiders. ARANEIFORM, a. *ăr'a-nē'ĭ-fawrm*, shaped like a spider (q.v.).

ARANGOES, n. pl. *ă-răn'gōz:* pierced beads of various forms made of rough carnelian, formerly imported from Bombay to be re-exported to Africa in the slave-trade.

ARANJUEZ, *â-rân-hwĕth'* [a corruption of the Latin *Ara-Jovis*, altar of Jupiter]: t. in the prov. of Madrid, Spain; on the left bank of the Tagus, 28 m. s.s.e. from Madrid, in a beautifully wooded valley; connected with the Spanish metropolis by a railway. The town is built in the Dutch style and has broad and regular streets intersecting each other at right angles. It is famed for its palace and gardens. The palace was long a favorite resort in spring of the royal family, during which period A. occasionally reckoned as many as 20,000 inhabitants; the gardens were laid out by Philip II., who built a palace also, for there was only a shooting villa here during his father's time, but a fire destroyed a portion of it, and more was taken down by Philip V., who reconstructed the edifice in French style. The present château was completed by Charles IV. On account of its gardens, the natives call A. 'the metropolis of Flora.' These gardens are interspersed with numerous summer-houses, the most celebrated of which is the *Casa del Labrador*, or Laborer's Cottage; but their most splendid ornament are the great elm trees brought from England by Philip II., which thrive magnificently. They radiate out from a central plot in 12 distinct rows. A. is known historically for the treaty of alliance concluded here between France and Spain 1772, Apr. 12, and as the scene of the abdication of Charles IV. 1808, Mar. 18. Pop. 8,154.

ARANY, *ŏr'rŏñ*, JANOS: 1817, Mar. 2—1882, Oct. 22; b. Nagy-Szalonta: next to Petöfi the most distinguished of modern Hungarian poets. His father was a poor peasant, who spared no pains to get him into the church. In 1832, he entered the college at Debreczin, where he distinguished

himself by his diligence; but unable to restrain his love of adventure, he joined, 1836, a company of strolling players, with whom he travelled about for several months, till, driven by necessity and an upbraiding conscience, he hurried home to do what he could for the support of a now blind and aged parent. At Szalonta he worked as a teacher of Latin and as a notary. When the Kisfaludy Soc. of Pesth offered a prize for the best humorous poem, A. sent in anonymously his *Az elveszett Alkotmány* (The Lost Constitution of the Past). He was successful. Thus emboldened, he ventured, 1847, to forward to the same soc. the first part of a trilogy, *Toldi.* Struck by the beauty of this purely national effort, the members published it at their own expense, and again rewarded the author. A. soon became a popular favorite, even in the lowest ranks of the community. In 1848, appeared his *Murány Ostroma* (Conquest of Murány), which received less attention owing to the political excitement of the time. The poet himself took a slight part in the revolution, but after the dismal termination of the war he was allowed to return to his country. He was afterwards professor of Hungarian literature, director of the Kisfaludy Soc., editor of a journal, and sec. of the Hungarian Acad. (1865–78). Later works are *Katalin* (1850), the third and second parts of *Toldi* (1854–79), *Buda Halàla* (1864), and a humorous poem recounting his early adventures (1874). Part of *Buda* has been translated into English.

ARAPAIMA, *ăr-ă-pī'mă;* genus of fresh-water fishes, the largest known fresh-water fishes in the world. They are found in the rivers of S. Amer., and are sometimes taken in the Rio Negro 15 ft. in length, and of the weight of 4 cwt. They are taken with the harpoon, and are highly esteemed for food, both fresh and salted. In the salted state, they have begun to form an article of commerce, and are conveyed in large quantities to Para. The genus *A.* belongs to the family of *Clupesocidæ*, a family of malacopterous fishes, allied to the *Clupeidæ* or herring family, and is remarkable for the mosaic work of strong, bony, compound scales with which the body is covered. About six species are known.

ARARAT, *ăr'a-răt* [*Airarat*, in the old Armenian dialect; i.e., the plains of the Aryans]: ancient name of the fertile plateau through which flows the river Aras or Araxes. It occupies the centre of the mountainous region of Armenia, belonging partly to Turkey and partly to Russia. Notwithstanding the passage Gen. viii. 4, where it is said that the ark rested 'on the mountains of Ararat,' it has become common to give the name A., not to the entire range, but to the mountain called by the Armenians Massis Leusar—i.e., 'mountain of the ark' (known among the Turks as Aghri-Dagh, 'steep mountain;' and among the Persians as Koh-i-Núh, 'Noah's mountain'). It rises in two volcanic cones, known as the Greater and the Lesser Ararat; the former, 17,212 ft. above the sea, is covered with perpetual snow. It is the highest elevation of Western Asia; and since the war of 1827 it forms the point where the Russian, Turkish, and Persian territories meet. In 1840, the form of the mountain

was partially changed by a frightful and destructive earthquake. Previous to this period, at the base of the mountain, and at a point where a stream runs from a wild gorge, there stood the village of Arguri or Aguri, surrounded by gardens and orchards, with upwards of 1,000 inhabitants. In the ravine 2,300 ft. above the village, stood the Armenian convent of St. James; and 1,000 ft. higher, still, a chapel dedicated to St. James. The beauty and mild air of the district made Arguri a favorite summer resort of the richer inhabitants of Erwan. It was to undergo a great change, however. On June 20, 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, the ravine was closed, the convent and chapel disappeared, and the village, and the gardens which surrounded it, were buried under rocks, earth, and ice, and with the inhabitants utterly destroyed. Tournefort made a partial ascent of the mountain in 1700; Professor Parrot of Dorpat and his companions were the first to reach the summit in 1829; since that time several ascents have been made.

ARAS, *ăr'as:* the ancient *Araxes*, a river of Armenia, formed by the junction of the Bingol-Su and the Kaleh-Su, and uniting its waters with those of the Kur (ancient *Cyrus*) after a course of about 500 miles. The main stream is the Bingol-Su, which rises in the Bingol-Tagh, lat. 41° 30′ n., and long. 41° 10′ e.; and flowing n.n.e. is joined a little below Hasan-kaleh by the Kaleh-Su, after which the combined stream is called the A. It then flows e., forming for some time the s. boundary of the province of Kars, till it is joined by the Arpa, which flows into it from the north. After this, it divides Russian and Turkish Armenia; at some distance to the s. of Erivan it turns to the s.e., along the base of Ararat; soon after which it receives the waters of the Zenghi, a river descending s. past Erivan. Near Djulfa it runs e. for about 60 m.; after which it runs to the n.e. for upwards of 125 m., till it is joined by the large river Kur, descending from the Caucasus through Georgia. Their united waters, after a short e. course, turn suddenly to the s., and fall by three mouths into the Gulf of Kizilgatch, in the Caspian, in lat. 39° 20′ n.

ARATUS, *â-rā'tŭs*, OF SICYON: a distinguished Greek statesman; b. abt. B.C. 271. His youth fell among the party strifes of his native town, in which his father, Clinias, met his death; and he himself was only saved by the efforts of his aunt, who had him secretly conveyed to Argos, whence he returned, in his twentieth year, and liberated Sicyon from its tyrant, Nicocles, B.C. 251. Supported by Ptolemæus Philadelphus, A. restored the republican form of government to Sicyon, and united it with the Achaian League, of which he was appointed general, B.C. 245. During his honorable but checkered career, this office was conferred on him seventeen times. His great object was to unite the Greek states, and form out of them an independent nation; but this was thwarted by their mutual jealousies. A. was a

brave general, a skilful tactician, and a disinterested patriot. A. died by poison administered to him by command of Philip III. of Macedon.

ARATUS OF SOLI (or Pompeiopolis, in Cilicia): wrote about B.C. 270, a Greek didactic poem, entitled *Phænomena*, founded on the astronomical system of Eudoxos of Cnidos, and appended to it another peom, *Diosemeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, which were translated into Latin by Cicero, Cæsar Germanicus, and Rufus Festus Avienus. A. was a native of the same province as the apostle Paul, who quotes from him in his speech on Mars' Hill: 'For as certain of your own poets have said, We also are his offspring' (Acts xvii. 28).

ARAUCANIA, *ă-raw-kâ'ne-â:* country of the Araucos or Araucanian Indians, in the s. of Chili. The Chilian province of Arauco, between the rivers Biobio and Valdivia, was incorporated 1852; but the Indians occupy a large territory in Arauco and the more s. provinces of Valdivia, and in 1870 acknowledged the rule of Chili. Their country is divided from n. to s. into four parallel regions, varying from each other, with some regularity, in soil and climate. There are the coast region, the plain region, the region of the Lower Andes, and the region of the Higher Andes. The productions of A. are similar to those of Chili. The pop. cannot be accurately estimated on account of the independence of the nation; but the most recent estimates of the aboriginal population are from 10,000 to 50,000.

The Araucanian has the proud distinction of being the last of the native tribes to submit to the rule of another race. From the days of Pizarro and Almagro they have uniformly vindicated their freedom—the wars of independence having lasted, with intervals of precarious truce, from 1537 to 1773. In 1861, a French adventurer, De Tonneins (1820-78), ingratiating himself with the Indians, was elected king of A.

ARAUCARIA, *ăr-aw-kā'rĭ-ă:* genus of plants of the natural order *Coniferæ* (q.v.) or Pines, consisting of lofty trees, natives of the s. hemisphere, and distinguished by having the male and female flowers on separate plants, the pollen of the male flowers contained in 10–20 cases pendent from the apex of each scale, the female flowers two under each scale; each having one ovule. The species are all evergreen, the leaves broader than in pines and firs, which the trees resemble in their general manner of growth. In warm but not excessively dry climates they are much planted for ornament, but in cool countries are grown in greenhouses on account of their tenderness. *A. imbricata*, sometimes called the CHILI PINE, a native of the Andes of Chili, forming forests on their w. declivities, attains a height of 150 ft., the trunk quite straight and free from knots. The bark of the young trees is studded with leaves from the base upwards, even until 12 or 15 years of age. The branches are in whorls of 6,

7, or 8. Young trees have branches almost from the ground; old trees have tall naked stems, with a crown of branches. The female strobile (cone) is roundish ovate, 8–10 inches in diameter, the scales terminated by a long awl-shaped point, the seeds wedge-shaped, and more than an inch in length. The outer and inner bark of full-grown trees are each 4–6 inches in thickness; the outer bark of a corklike texture; the inner, fungous and porous. From both outer and inner bark, and indeed from all parts of the tree, resin flows readily and in great abundance. The leaves are lanceolate, about 1½ inches in length and ¼ inch in breadth near the base, sharp-pointed. The timber is heavy, solid, hard, fibrous, yellowish white, and beautifully veined. It is very suitable for masts of ships. The resin, which is white, has a smell like frankincense, and a not unpleasant taste. It is applied as a plaster to contusions. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food to the Indians. It is eaten raw, boiled, or roasted. A spirituous liquor is also distilled from it. A single strobile sometimes contains between 200 and 300 seeds, and one tree may be seen loaded with 20 or 30 of these great strobiles. *A. Brasiliana*, the Brazil Pine, has loosely imbricated lanceolate leaves, and a looser and more spreading habit than *A. imbricata*. The seeds or nuts are sold as an article of food in Rio Janeiro. The resin which exudes from the tree is mixed with wax to make candles. *A. excelsia*, now called *Eutassa excelsa* (and by some *Altingia*), the Norfolk Island Pine, a native of Norfolk Island, New Caledonia, etc., attains a height of 160–220 ft., free from branches to 80–100 ft., and with a trunk sometimes 11 ft. in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. The leaves of the young trees are linear and spreading; those of the adult are ovate, and closely imbricated. The strobiles are ovate, 4–5 inches in length. *A. Cunninghamii*, now also ranked in the new genus *Eutassa* or *Altingia*, the Moreton Bay Pine, a native of the shores of Moreton Bay and banks of the Brisbane river in New South Wales, very much resembles the last. It attains a height of 60–130 ft., and a diameter of 4–8 ft. The leaves of the adult trees are lanceolate and imbricated. The wood is yellowish, and is used for boat-building, house-carpentry, and the common kinds of furniture. The large seeds of *A. Bidwillii* are used for food by the natives at Moreton Bay.

Certain fossil *Coniferæ* found in carboniferous sandstone have received the name *Araucarites*. Livingstone found a forest of large silicified trees near the Zambesi, which Mr. Quekett, on examination of specimens, ascertained to be 'silicified coniferous wood of the Araucarian type.' Fossil trees of the same type occur in the carboniferous strata of Britain. The woody fibre exhibits rows of dots that alternate with dots of other rows, unlike other pines.

ARAUCARITES, n. plu. *ă-raw'kăr-ītz* [*Arauca'rĭăn*, an Indian tribe of Chili]: in *geol.*, the fossil wood whose structure is identical with that of the living AR'AUCA'RIÆ, *-kā'rĭ-ē*—trees, natives of the southern hemisphere.

ARAUJO DE AZEVEDO, *â-row'zho dâ zā-vā'do*, ANTONIO DE, afterwards Count da Barca: 1754, May 14—1817, June 21; b. Sá, near Ponte de Lima, Portugal. At the age of 11, he was sent to Oporto to study under his uncle, who held a high military command. In 1787, he was appointed Portuguese ambassador to the Hague. Before entering on his duties, he visited England, where he omitted no opportunity of obtaining a knowledge of English manufactures, commerce, politics, etc Then he employed himself similarly in Paris.

At length he resigned his ambassadorship (for the political complications, see under PORTUGAL—*History*) and travelled through Germany, enlarging the sphere of his studies in various departments, scientific and literary. After the Peace of Amiens, A. was sent as ambassador to St. Petersburg; in 1803, he was recalled to Lisbon, to assume the office of sec. of state; and in 1806 he obtained the highest political dignity in the kingdom. His efforts to introduce the various agencies of civilization, while he occupied this situation, were unremitting. But the sudden approach of the French army put an end to all his improvements. The royal family, which Bonaparte had formally dethroned in his victorious proclamation, emigrated to Brazil. A. embarked also, taking a complete printing apparatus, his mineralogical collection, arranged by Werner, and all necessary chemical instruments. During the first years of his residence in Brazil, he devoted himself assiduously to scientific and literary pursuits; founded a school of medicine and chemistry, introduced the cultivation of tea, an improved machine for sawing wood, and a sugar-alembic, and established a porcelain manufactory. He had also a magnificent garden, the plants of which were scientifically arranged.

ARAURE, *â-row'rā:* t. of Venezuela, S. America; lat. 9° 17′ n., long. 69° 28′ w.; 60 m. e.n.e. of Trujillo, in a region noted for its fertility in the production of cotton, coffee, cattle, etc. Pop. 4,000.

ARAVULLI, *ăr'a-vŭl'lē:* range of mountains in w. India; from about 22° 40′ n. lat., 74° e. long., to 26° 50′ n. lat., 75° e. long. The highest summit is Abu (q.v.). The n.e. extremity of the range sinks into comparatively low rocky hills. The n.w. side is very bold and precipitous, the s.e. less so. There is no road practicable for wheel-carriages across this range for a distance of 220 m.

ARAWAKAN *â-ra-wâ'kan*, STOCK (from the Arawaks below): the most widely diffused linguistic stock of South America. Their habitat reached from Bolivia and southern Brazil not only to the northern coast of Venezuela, but—while barred to the westward by the Colombian Chibchas or Muyscas of the Magdalena basin—occupied the entire

West Indies and had an outlier of several villages in Florida. Just before Columbus' discovery, however, they had been expelled from the southern Antilles and part of the adjoining South American coast by the Caribs from the lower Orinoco. The Arawakans have neither the energy and cohesiveness of the Araucans, the splendid physique and fiery vigor of the Caribs, nor the political development of the Quichuas in the past; they are below the medium stature, and of no great stamina. Yet they had, perhaps owing to this very lack of savage vigor, an intellectual and artistic development and a stage of culture above the surrounding tribes: they made fictile vases decorated with grotesques of men and animals, were skilful artisans in stone, gold, and wood, and excellent weavers; and the island Arawakans cultivated not only corn and manioc for food, but cotton and tobacco, whose use the Europeans took from them. There are probably a hundred or more different tribes of this stock scattered through Brazil, Bolivia, the Guianas, Venezuela, and Colombia. Among the chief, besides those mentioned below under Arawaks, are the Manaos near that city, at the junction of the Amazon and Negro; the Waupes, Maipures, and Miranhas, in the extreme west of Brazil next to Colombia, on the llanos between the Negro and Amazon; the Goajiros on that peninsula west of the Gulf of Venezuela; the Piaroas on the Orinoco near its junction with the Meta; the Maneteneris in the northwest angle of Bolivia; the Baures and the Moxos or Mojos in northeast Bolivia, next Matto Grosso; and the Antas in extreme south Brazil, near Uruguay.

ARAWAKS, *â'ra-wâks:* a tribe of South American Indians living on the coast of British and Dutch Guiana, across the Corentyne and Berbice rivers, and taken as the type of the great Arawakan stock. They are not pure-blooded, however, being mixed with Caribs, etc., in a conglomerate of plantation laborers. The term is also used in a broader sense to include all the tribes of this stock in British Guiana and the neighboring corner of Brazil, with the extension noted into Dutch Guiana: Tarumas and Atoradis of the upper Essequibo basin, Wapisianas of the upper Rio Brancho in Brazil, etc., as well as Arawaks proper. The Atoradis are almost white, or not duskier than South Europeans, with fine figures, especially the women having much beauty and dignity of appearance. The Wapisianas are browner and less graceful, but their language is soft, sonorous, and vocalic.

ARBACES, *âr-bā'sēz:* founder of the Median empire, B.C. 876. He was one of the generals of Sardanapalus, king of Assyria, and had command of the contingent from the prov. of Media. He conspired with Belesys, a Chaldæan priest, who commanded the troops from Babylon, and having gained over several other officers of the king, they revolted. After a short contest, Sardanapalus was defeated, and committed suicide. The dynasty founded

by A. lasted till its overthrow by Cyrus, B.C. 559. Arbaces, the Mede, is to be distinguished from the satrap of the same name who commanded a division of the army of Artaxerxes in his war with his brother Cyrus.

ARBALEST, *âr'bă-lĕst*, or ARBALIST, n. *-lĭst*, or ARBLAST, n. *âr'blăst*, or AR'CUBALIST [L. *arcus*, a bow; *balis'ta*, an engine for throwing stones or darts]: in *OE.*, a crossbow. ARBALISTER, n. *ăr'bă-lĭs'tėr*, a crossbow-man. The A. or Crossbow was a weapon much in use in feudal times. Its recognized position among military arms dated from about the period of Richard I. The smaller kinds of A. were bent by pressing the hand on a small steel lever called the 'goat's foot'; but the larger kinds were bent by placing the foot in a loop or stirrup at the end of the central shaft, and drawing the cord upwards with the hand. At a later period, the bow was made very strong, often of steel; in this form it required a mechanical contrivance, called a 'moulinet,' to bend it. Sometimes ordinary arrows were used with the A., but more usually arrows of a shorter and stouter kind, called 'carrials,' or 'quarrels,' were employed; these had a four-sided pyramidal form of head. Occasionally stones and leaden balls were shot from the larger Arbalests. The arbalisters, or crossbow-men, carried a quiver with fifty arrows as an armament in some of the battles of the 13th c. They were an essential component of armies of that period, taking up their position in the van of the battle-array; some were mounted, some on foot, and they occasionally wore armor. The supply of arrows or quarrels was carried after them to the battle-field in carts. The A. continued to be a favorite weapon in England throughout the 13th c.; but in the 14th, it gave way to the long-bow, which was found more convenient in battle. For the long-bow, see BOW AND ARROW; for the military system to which it belonged, see ARCHERS AND ARCHERY.

ARBALESTI'NA: in the military system of the middle ages, a small window or wicket through which the crossbow-men shot their quarrels or arrows at an enemy besieging a fortified place.

ARBELA, *ăr-bē'lâ*, now ERBIL or ARBIL: a small t. of Assyria, e. from Mossul, famous as having given name to the battle in which Alexander finally defeated Darius, B.C. 331. The battle was really fought near Guagamela (the 'camel's house'), to the n.w. of A.

ARBER, *âr'bėr*, EDWARD: an English scholar, emeritus professor of English literature at Mason College, Birmingham. He is best known through the excellent reprints of which he is editor. These include *English Reprints* (1868-71); *Tyndale's New Testament of* 1525 (1871); *A Transcript of the Registers of the Company of the Stationers at London* (1875); *An English Corner* (1877-96); *An English Scholar's Library* (1878-84); *The First Three English Books on America* (1885); *The Story*

of the Pilgrim Fathers, 1606-23 (1897); *British Anthologies* (1899-1900); *The Term Catalogues* (1903-5).

ARBITER, n. *âr'bĭ-tėr* [L. *arbĭter*, an umpire or judge: Fin. *arpa*, a lot or symbol]: one appointed to settle a dispute, one intrusted with the power of decision or regulation. ARBITRAMENT, n. *âr-bĭt'ră-mĕnt*, decision; determination. ARBITRABLE, a. *âr'bĭ-tră-bl*, determinable. ARBITRAL, a. *âr'bĭ-trăl*, of arbitration. ARBITRARY, a. *âr'bĭ-trėr'ĭ*, despotic; tyrannical; guided by will only. AR'BITRAR'ILY, ad. *-ĭ-lĭ*, with no other rule or guide than the will. AR'BITRAR'INESS, n. the quality of being tyrannical or despotic. ARBITRATE, v. *âr'bĭ-trāt* [L. *arbitrātus*, pronounced upon, as a dispute]: to hear and decide in a disputed matter; to determine. AR'BITRA'TING, imp. AR'BITRA'TED, pp. ARBITRATION, n. *âr'bĭ-trā'shŭn*, the hearing and deciding of a disputed matter by one or more persons. ARBITRATOR, n. *âr'bĭ-trā'tėr*, a person chosen to decide a dispute; he who, or that which, puts an end to a thing; an arbiter. ARBITRESS, n. *âr'bĭ-trĕs*, or ARBITRATRIX, n. *âr'bĭ-trā'trĭks*, a woman that decides.—SYN. of 'arbiter': arbitrator; umpire; controller; governor; ruler; judge; referee;—of 'arbitrary': absolute; despotic; tyrannical.

AR'BITRAGE: term used for the comparison and settlement of disputed accounts, and the composition of business, or trade disputes. The expression is applied, e.g., to the adjustment of prices of any commodity simultaneously in two or more markets, in terms of the quotations employed in a given locality, the difference of exchange being calculated. It is also applied to business done on the basis of such calculations, as by making purchases in whatever is for the moment the cheapest market, and selling in the dearest; in this sense it is used in traffic in bills and exchange, in coin and bullion, and in stocks, as well as in commodities.

ARBITRA'TION: adjudication by private persons appointed to decide a matter, or matters in controversy, or a reference made to them for that purpose, either by agreement of the disputants or by the order, or on the suggestion, of a court of law. The proceeding generally is called a *submission to arbitration*, or *reference;* the parties appointed to decide are termed *arbitrators* or *referees;* and their adjudication is called an *award*. This mode of settling disputes is not only frequently resorted to by litigants themselves, who are anxious to avoid the delay and expense of proceedings in the public tribunals, but the statute-books bear witness to the approval of it by the legislature at various times, and there are recent statutes rendering A., or private reference, in certain cases compulsory. International arbitration has been of late repeatedly resorted to in matters of debate between nations. Thus as between the United States and Britain, the San Juan boundary question and the Alabama (q.v.) dispute were so arranged. Diplomatic conferences,

which often obviate war, belong to a different category. See LONDON CONFERENCES.

The matters that may be determined by an arbitrator are all personal disputes and differences which might otherwise be made the subject of controversy in the courts of civil jurisdiction. Thus breaches of contracts generally, breaches of promises of marriage, trespass, assaults, charges of slander, differences respecting partnership transactions or the purchase price of a piece of property, all may be referred to A. Questions relating to real property all may also be referred, such as those relating to the partition of lands of joint tenants or tenants in common to settlements of disputed boundaries—to differences between landlord and tenant respecting waste—and to the title to land. Pure questions of law may also be referred to the decision of an arbitrator. An arbitrator may have, therefore, to determine the liability of a party on a promissory-note or bill of exchange, or to construe an act of the legislature, or to give a judicial opinion on the effect of a will or deed. Actions at law, and suits in equity, may also be settled by A.; and this kind of reference may be made at any stage of the proceedings, sometimes even after the verdict, and probably by analogy, after decree in equity. Questions relating to the future use and enjoyment of property, and future or anticipated differences between parties, may likewise be referred. In some of the states, however, some matters depending on points strictly technical are excluded from A., in view of the fact that arbitrators often are not learned in the law.

A matter, however, clearly illegal, cannot be made the subject of a valid reference. But where transactions between parties have been brought to a close by a general award, apparently good, the courts have refused to reopen them on a suggestion that some legal item had been admitted in account.

It is not the policy of the law to refer to A. felonies and offenses of a public nature; because the public safety requires them to be punished, and for this purpose they can be properly tried only in one of the ordinary courts of the country.

Yet there are certain misdemeanors which may be settled either by agreement or by means of an A., on a principle of very general application which has been well stated—that where there is a remedy, by action as well as by indictment, a reference of the matter in controversy is good. And in these cases of misdemeanor, a compromise or settlement under a reference may be made, even after conviction, but with the sanction of the court.

As to the parties who may make a reference to A., it may be stated generally that every person capable of making a disposition of his or her property or release of rights, may make a submission to an award.

Partners and corporations may make references to A.

on the principles above noted, and according to the relation in which they stand to the matter in dispute.

As to a reference to A. by act of counsel, aside from client, formerly advocated by high English authority, the feeling of the bar in England now is that it is unwise to refer or compromise a litigation on the independent authority of counsel.

Disputes may be referred to A. in any manner that expresses the agreement or understanding of the parties to be bound by the decision of the arbitrator; and for this purpose no formal submission, either verbal or written, is necessary as a rule. In California, Louisiana and New York, however, special statutes provide that the submission must be in writing, but the arrangement must be such as manifestly to show an intention to have the difference concluded by a private adjudication in the nature of an award. But where the submission is in writing, it must be executed in due form. A testator, however, cannot exclude his will from litigation by a proviso, that all differences respecting it shall be referred to A., although it is thought that the parties benefited by the will might themselves so refer. Generally speaking, it is advantageous to make the A. in such a form as that the award may be made a rule of court—that is, may be adopted by a court of law as its judgment on the matter submitted, a proceeding that affords an obvious facility in enforcing the award.

The arbitrator ought to be a person who stands perfectly indifferent between the disputants; but there are no other particular qualifications for the office. And the choice by parties of the person who they agree shall decide between them is perfectly free. The only exception to this rule is the case of a party who, by office or position, is the person pointed out for the duty under a reference made by statute. In matters of complicated accounts, mercantile men are generally preferred. In other cases, it is usual to appoint lawyers, who, being accustomed to judicial investigations, are able to estimate the evidence properly, to confine the examination strictly to the points in question, and, in making the award, to avoid those informalities in respect of which it might afterwards be set aside. Both time and expense are thus saved by fixing on a professional arbitrator.

The proceedings before an arbitrator are regulated according to the peculiar circumstances of the case submitted, but generally it is advisable to conduct them according to the forms observed in courts of law, and they usually are so conducted. Each of the parties furnishes the arbitrator with the statement of his case, which is done by giving him a copy of the briefs on each side; and on the day appointed he proceeds to hear them (either in person or by their counsel or attorneys), and to receive the evidence on each side, nearly in the same manner as a judge at an ordinary trial. Having so heard the case, the arbitrator proceeds to make his

award, which need not necessarily be in writing, except in certain States where the statutes require a written award. In practice, however, it is usual for the arbitrator to make written award which he delivers to the successful party. The unsuccessful party also gets a copy of the award. This award in its effect operates as a final and conclusive judgment respecting all the matter submitted, and it binds the rights of the parties for all time.

An award may be set aside on the ground of corruption and fraud in the arbitrator, and for any material irregularity or illegality appearing on the face of the proceedings. But the tendency of the courts is to favor arbitrations and maintain awards, unless such serious grounds as are above referred to can be substantiated.

Where there are two arbitrators, the submission often provides that in the case of their differing in opinion the matter referred shall be decided by a third person, called an umpire, who is generally appointed under a power to that effect, by the arbitrators themselves. But they cannot make such an appointment unless specially authorized so to do by the terms of the submission. This umpire rehears the case, and for this purpose is invested with the same powers and bound by the same rules as the arbitrators.

In A., from the nature of the case, there can be no appeal on the merits of the dispute to any public tribunal.

ARBITRATION, INTERNATIONAL: the referring of matters in dispute between nations to a person or persons approved by both disputants. During the 19th century the questions settled by international arbitration grew in numbers and importance, and efforts were made to establish a permanent system of arbitration.

Much has been done for the principle of A. by the International Law Association, organized at Brussels in 1873 as the Assoc. for Reform and Codification of the Laws of Nations. Its membership is drawn from all the chief nations and represents the highest standard of ability, learning, and public spirit, and it 'aims to promote international arbitration, to conserve the peace of the world,' etc. The International Peace soc. also has labored effectively for the same object. For notable instances of A. in controversies between the United States and Great Britain, see GENEVA ARBITRATION: VENEZUELAN QUESTION. After long correspondence between the Marquis of Salisbury and Secretary of State Olney, a General Arbitration Treaty between Great Britain and the United States was agreed on, and, 1897, Jan. 11, submitted to the U. S. senate, where it was finally defeated, May 5. In 1898 the U. S. and Canada agreed to submit to a joint high commission all questions at issue between them, including those of the Alaskan boundary, war vessels on the lakes, reciprocity of trade, and fisheries. Prolonged sessions were held at Quebec and Washington and substantial progress was made in the settlement of many of

the questions, but the commissioners were unable to agree upon that of the Alaskan boundary. In 1899 a provisional boundary was agreed upon, a *modus vivendi* was signed, and negotiations ceased. In 1903 this last serious difference with Great Britain was adjusted; a treaty signed by Secretary Hay and Ambassador Herbert referring the question to a mixed commission of 6 jurists. Meanwhile the most important advance in the history of A. had been made. In 1899 the International Peace Conference at The Hague established a permanent court of A. This body is composed of 4 persons of recognized competence in questions of international law, from each of the 15 leading nations of the world, who serve for 6 years or longer. From these arbitrators each of the powers on the brink of war may select 2 and they shall choose together an umpire.

ARBITRATION, Labor: the reference of questions in dispute between employers and employees to a third party. The arbitrator is sometimes a single person agreed upon by both parties to the dispute, but more usually is a body composed of representatives of capital, of labor, and of the general public. Arbitration may be resorted to either to prevent a strike, when other means have failed to effect a settlement, or when a strike is in progress with no signs of settlement by any other method. The decision of the arbitrators is very generally a compromise between the demands of the two disputants, and while not as satisfactory to either as a complete victory, is preferred by both to a long and costly struggle.

Australia has led the world in establishing the principle of compulsory arbitration in some of the States of the Federation. In New South Wales, the arbitration tribunal consists of a judge of the supreme court, a representative appointed by the employers, and a representative appointed by the employees. This court has jurisdiction in the case of industrial disputes, and a lockout or a strike before allowing time for reference to the court or pending the proceedings of the court is illegal. In England the London Corporation and the London Chamber of Commerce founded jointly in 1892 a chamber of arbitration for settling trade and commercial difficulties; and the coal strike of 1893 led to a conference which resulted in the foundation of a permanent 'Board of Reconciliation' consisting of representatives both of owners and of miners.

In the United States, arbitration has often been resorted to, but no permanent provision was made for any tribunal of arbitration until 1901, when a board consisting of representatives of the general public, of employers and of organized labor was formed by the National Civic Federation, and became the industrial department of that Federation. No power of arbitration is assumed by this board unless such power is conferred by both parties concerned in the dispute, but it has been instrumental in the prevention of several strikes and the final

settlement of others. Another important example of arbitration in the U. S., was the settlement of the anthracite coal strike of 1902 by a commission appointed by the President of the United States.

ARBOGA, *ar-bo'gâ:* ancient city in Sweden, prov. of Westmannland, on a small river of the same name, by which, with the aid of a canal, the lakes Hialmar and Mälar are united. A. was an important commercial town, but is now insignificant. Church assemblies were held here in 1396, 1412, 1417, 1423, 1474; diets in 1435, 1440, 1471, 1529, and 1561, in which last year also certain articles, known as the A. Articles, were passed, by which Eric XIV. was enabled to limit the power of the nobles; and in 1625, Gustavus Adolphus issued an edict here, commanding that the copper coin of the realm should contain its full worth of copper. Pop. (1901) 5,250.

ARBOR, n. *âr'bėr* [L. *arbor*, a tree: OE. *herbere* (*hėr'bēr*), a garden]: a seat shaded with trees; a bower; an axis or spindle. ARBORATOR, a. *âr'bŏ-rā'tėr*, one who grows trees. ARBORED, a. *âr'bėrd*, furnished with an arbor. ARBOROUS, a. *âr'bŏ-rŭs*, or ARBOREOUS, a. *âr-bō'rē-ŭs*, resembling or belonging to a tree. ARBORESCENT, a. *âr'bŏ-rĕs'ĕnt* [L. *arbores'cens* or *ar'borescen'tem*, growing to a tree]: branched like a tree; having crystallizations disposed like the branches of a tree; in moss-like aggregates like the frost-flowers on a window-pane; becoming woody. AR'BORES'CENCE, n. *-sĕns*, or AR'BORIZA'TION, n. *-ĭ-zā'shŭn*, the resemblance of a tree in minerals; groups of crystals in the form of a tree. AR'BORET, n. a small tree; a shrubbery. ARBORETUM, n. *âr'bŏ-rē'tŭm* [L.]: a place for cultivating rare trees and shrubs. ARBORICULTURE, n. *âr'bŏr-ĭ-kŭlt'ūr*, [L. *cultu'ra*, tillage]: the art of planting and managing trees and shrubs. AR'BORICULT'URAL, a. *-ūr-ăl*, pertaining to. AR'BORICULT'URIST, n. *-kŭlt'ūr-ĭst*, one who. AR'BORIST, n. one who studies trees.

ARBOR DAY: was originated by Hon. J. Sterling Morton in 1872, and was established for the purpose of interesting school children and the people in general in the planting of forest trees. Each year proclamations are made by the President and Governors of states setting aside a day in early spring for the general planting of trees on school grounds, about homes and along streets.

ARBORETUM: the term arboretum as commonly used is applied to plantings of different species for illustrative and experimental purposes. Such plantings have been carried on in Europe for centuries. Several arboretums were established in this country as early as the fore part of the Seventeenth Century. The first one was called a botanical garden and was begun by John Bartram, a wealthy Englishman living in Philadelphia. Others were established about Philadelphia which are now Woodland Cemetery and Laurel Hill Cemetery.

The largest and best arboretum in the country is that

at Harvard University, near Boston. It contains 125 acres on which there are several thousand species and varieties of trees and shrubs growing. This is called the Arnold Arboretum and was founded on a bequest from James Arnold of New Bedford, Mass. There is an extensive arboretum on the grounds of the Department of Agriculture at Washington, D. C., and others at the Ohio Wesleyan University, the Shaw Botanical Gardens, St. Louis, Mo., and the New York Botanical Gardens at Bronx Park, New York.

ARBORICULTURE: the term arboriculture is derived from the Latin 'arbor' meaning 'a tree.' It is a general term which is applied to the whole subject of planting, cultivation, propagation and harvesting of trees. There are a number of terms which are more specific and which are included under the head of arboriculture. The term 'silviculture' is one of the most common of these and it includes all that we know regarding forest vegetation.

The subject of arboriculture, while really including such knowledge as we have of the growing of fruit, has in this country been used synonymously with silviculture and erroneously has been taken to mean forest culture or forestry. This is shown by the fact that numerous articles have been published in such magazines as *Forestry* and *Irrigation* on the subject of arboriculture which have discussed only the growing of forest trees. Again there is a magazine entitled *Arboriculture*, published in Connersville, Ind., which is the monthly official organ of the International Society of Arboriculture. In the articles of incorporation the purpose of this association is stated as follows:

'To introduce judicious methods in dealing with forests and woodlands; to advance and advocate a public interest in this subject; to promote afforestation of unproductive lands; to encourage the planting and care of shade trees in public and private grounds and along streets and highways; to inspire an interest in our remaining native forests and groves of ancient trees and to secure their preservation, etc.

Literature upon the subject of Arboriculture in this country is very limited. A work entitled *Arboriculture*, by Gregor, was published in 1868 by Edmonston and Douglas, Edinborough, Scotland, and John P. Brown of Connersville, Ind., published *Practical Arboriculture* (1906).

ARBOR VITÆ, *ȧr'bŏr vī'tē* (*Thuja*): a genus of plants of the natural order *Coniferæ*, allied to the cypress; consisting of evergreen trees and shrubs with compressed or flattened branchlets—small, scale-like, imbricated leaves—and monœcious flowers, which have 4-celled anthers, and the scales of the strobiles (or cones) with two upright ovules.—The common A. V. (*T. occidentalis*) is a native of N. Amer., but has long been well known in Europe. In some localities it forms a tree of 40–50 ft. high. The CHINESE A. V. (*T. orientalis*)

does not attain so great a size as the preceding, and is more sensitive to the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin, having a pleasant odor, to which high medicinal virtues were formerly ascribed; hence the remarkable name, *Arbor Vitæ* (Latin, signifying Tree of Life), given to this species, and extended to the genus. Other species are known, but they are less important than these. In its native country, this species also attains the size of a considerable tree.—There are several other species of *Thuja*, some of which seem well suited to the open air in the climate of Britain and the n. United States, and others require the protection of greenhouses. Among the former are *T. plicata*, from Nootka Sound; and *T. dolabrata*, native of Japan, a tree of great height and thickness, and which will probably prove the most important of the whole genus.—A tree, common in N. Amer., and there known by the name of WHITE CEDAR, is sometimes included in the genus *Thuja*, under the name of *T. sphæroidea*, but is more generally ranked in the genus *Cupressus* as *C. thyoides*. See CYPRESS. The timber is highly esteemed, and an infusion of the scrapings is sometimes used as a stomachic. Closely allied to the genus *Thuja* is *Callitris*. See SANDARACH.

ARBROATH, *âr'brōth*, ABERBROTH'WICK, or ABERBRO'THOCK: seaport town in the e. of Forfarshire, at the mouth of a stream called the Brothock. Pop. (1901) parliamentary burgh, 22,372. Here King William the Lion founded a Tyronensian abbey in honor of Thomas à Becket, 1178. The king was interred in it, 1214. In the abbey, Bruce and the Scottish nobles met in 1320, to resist the claims of Edward II. to Scotland. Cardinal Beaton was the last of its abbots. Next to Holyrood, the abbey was the most richly endowed monastery in Scotland. It was destroyed by the Reformers in 1560. Its ruins—which are cruciform, 270 by 160 ft.—are very picturesque, presenting lofty towers, columns, Gothic windows, and a fine circular e. window, 'the Round O of A.' The chief industries of A. are flax-spinning, jute-spinning, and the manufacture of sail-cloth. The new harbor, begun 1841, admits vessels of 400 tons; it is protected by a breakwater. The chief exports are grain, potatoes, fish, pork, and pavement, chiefly from quarries 8 or 10 m. inland. A. is a royal burgh, and in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to parliament. A. is supposed to be the Fairport of *The Antiquary*.

ARBUSCLE, n. *âr'bŭs-sl* [L. *arbus'cula*, a small tree]: a dwarf tree; a small shrub with the appearance of a tree, as many heaths. ARBUSCULAR, a. *âr-bŭs'kū-lėr*, shrub-like. ARBUSTIVE, a. planted with shrubs or trees; containing copses of shrubs or trees.

ARBUTE, n. *âr'būt* [L. *ar'bŭtus*]: the strawberry tree. ARBUTEAN, a. *âr-bū'tē-ăn*, pertaining to.

ARBUTHNOT, *ȧr'bŭth-not*, JOHN: d. Hampstead, 1735, a distinguished writer and physician, contemporary and friend of Pope and Swift: son of a Scottish Episcopal clergyman; born at Arbuthnot, Kincardineshire, shortly after the Restoration. He studied medicine at Aberdeen; and, removing to London, supported himself by teaching mathematics. In 1697, he published an examination of Dr. Woodward's account of the Deluge, which brought him into notice. Accident called him into attendance on Prince George of Denmark, who thenceforth patronized him. In 1709, he was appointed physician to the queen, and in 1710 was elected a member of the Royal College of Physicians. On the death of Queen Anne, 1714, he lost his situation. In 1717, A., with Pope, gave assistance to Gay in a farce entitled *Three Hours after Marriage*, which, though having the aid of a trio of wits, was a failure. In 1723, he was chosen second censor of the Royal College of Physicians; in 1727, he was made an Elect, and had the honor to pronounce the Harveian oration for the year. A. was one of the leaders in that circle of wits which adorned the reign of Queen Anne, and was still more nobly distinguished by the rectitude of his morals and the goodness of his heart. He assisted Swift and Pope in the composition of that brilliant satire, the *Memoirs of Martinus Scriblerus*, contributing those portions of it which refer to science and philosophy; and he was undoubtedly the author of the celebrated political *jeu d'esprit*, the *History of John Bull*, which has so often been imitated. Besides several medical essays, he published *Tables of Greek, Roman, and Jewish Measures, Weights, and Coins* (Lond. 1705–08), a work which was long the best authority on the subject. There is also a philosophical poem of his composition in Dodsley's Miscellanies, entitled *Know Thyself*.

ARBUTUS, *ȧr'bū-tŭs:* genus of plants of the natural order *Ericeæ*, containing a number of species, small trees and shrubs, the greater part of which are American. The fruit is fleshy, 5-celled, many-seeded, usually dotted with little projections, whence that of some species has a sort of resemblance to strawberries; the corolla is urn-shaped.—*A. Unedo*, the STRAWBERRY TREE, is a native of the s. of Europe, found also in Asia and America, and in one locality in the British Isles, the Lakes of Killarney, where its fine foliage adds much to the charm of the scenery. It requires protection in winter in the climate of Paris. In Britain, it is often planted as an ornamental evergreen. It grows to a height of 20–30 ft., but is rather a great bush than a tree. The bark is rugged; the leaves oblongo-lanceolate, smooth and shining, bluntly serrated; the flowers nodding, large, greenish white; the fruit globose, of a scarlet color, with a vapid sweetish taste. It is, however, sometimes eaten. Of late, excellent alcohol has been made from it in Italy. A wine is made from it in Corsica, which, however, is narcotic, if taken in considerable quantity, as the fruit itself is, if eaten too freely. The bark and leaves are astringent.—*A. Andrachne* is also sometimes cultivated as an ornamental plant in Britain, but is im-

patient of severe frosts. Its fruit, and that of *A. integrifolia*, are eaten in Greece and the East. But all the species seem to possess narcotic qualities in greater or less degree; the fruit of *A. furens*, a small shrub, a native of Chili, so much as to cause delirium.—*A. aculeata*, which abounds at Cape

Arbutus Unedo, showing branch, flowers, and fruit.

Horn and on Staten Island (lying s.e. of Terra del Fuego), is an elegant and most pleasing evergreen, much resembling the myrtle. It grows to the height of 3 or 4 ft., and produces small white flowers, followed by a profusion of red shining berries, which ornament the bush during winter. Their flavor is insipid, but somewhat astringent. Mixed with a few raisins, they have been made by voyagers into tolerable tarts.—*A. Uva ursi*, now generally called *Arctostaphylos Uva ursi*, the RED BEARBERRY, is a small trailing evergreen shrub, common in the Highlands of Scotland and in the Hebrides, and indeed in the northern parts of Europe, Siberia, and North America. It grows in dry, heathy, and rocky places. The flowers are in small crowded terminal racemes, of a beautiful rose color. The berries are austere and mealy; they are said to form a principal part of the food of bears in northern regions. Grouse also feed on them. The dried leaves are used as an astringent and tonic medicine, and as such have a place in the pharmacopœias, being employed principally in chronic affections of the bladder; but those of *Vaccinium vitis Idæa* are often fraudulently substituted for them.—The BLACK BEARBERRY (*A.* or *Arctostaphylos alpina*) is also a native of the northern parts of the globe, a small trailing shrub, with black berries about the size of a sloe, relished by some, but having a pecular taste disagreeable to others. The plant is found in the Alpine localities of N. Hampshire and Maine.

ARBUTUS, TRAILING or MAYFLOWER: see EPIGÆA REPENS.

ARC, n. *ârk* [L. *arcus*, a bow]: a part of a circle or

curved line. ARCADE, n. *âr-kād'* [F.—from L. *arcus*]: a series of arches; a roadway under a continued series of arches; a covered street. ARCAD'ED, a. furnished with an arcade. ARC OF A CIRCLE, a part of the circumference of a circle cut off by two lines radiating from its centre: see ARCH 1.

ARC: any part of a curved line. A straight line joining the ends of an A. is its *chord*, which is always less than the A. itself. Arcs of circles are *similar* when they subtend equal angles at the centres of their respective circles; and if similar arcs belong to equal circles, the arcs themselves are *equal*. The length of an A. is readily found if the angle which it subtends at the centre of the circle is known, and also the length of the whole circumference. Let the whole circumference be 100, and the angle of an A. 50°, the length of the A. is $360° : 50° :: 100 : \frac{100 \times 50}{360} = 14$ nearly.

ARC: see JOAN OF ARC.

ARCA, *âr'kă*, or ARK-SHELL [L. *arca*, a chest or box]: a genus of equivalve shells, and lamello-branchiate Mollusca, the type of a family called *Arcadæ*, or *Arcaceæ;* found in almost every part of the world. In the true ark-shells, the hinge is straight.

ARCACHON, *ar-kâ-shōng':* it is a popular summer bathing-place 35 m. s.w. of Bordeaux, France. The fine broad sands are admirably adapted for bathing; and the place is sheltered by sand-hills, covered with extensive fir woods. Its numerous villas among the firs are much frequented in winter by invalids afflicted with lung disease. Scientific oyster culture is practiced here on a large scale. Pop. (1901) 7,120.

ARCADE: a row of arches, supported by columns, either having an open space of greater or less width behind them, or in contact with masonry. The A. in Gothic corresponds to the colonnade in classical architecture. The term A. is sometimes applied to the row of piers, or columns and arches, by which the aisles are divided from the nave of a church, or by which cloisters, sometimes erroneously called piazzas, are enclosed; but it is generally confined to those series of smaller arches which are employed for purposes of ornamentation. Arcades of the latter kind are often found surrounding the square towers of English churches. The term is also applied, improperly, to a glass-covered street or lane, with a row of shops or stalls on each side.

ARCADIA, *âr-kā'dĭ-a:* the middle and highest part of the Peloponnesus: was bounded on the n. by Achaia, on the e. by Argolis, on the s. by Messenia and Laconia, and on the w. by Ellis. According to Pausanias, it derived its name from Arcas, the son of Callisto. Next to Laconia, A.

was the largest country in the Peloponnesus. It had an area of 1,700 sq. m., and was girt round by a circle of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions. The western part of what was anciently A. is wild, bleak, and rugged, and was at one time covered with huge forests; the eastern is more fertile, the mountains not so high, and the vales more luxuriant. In these eastern valleys lay all the principal cities of A. The loftiest peak in A.—the loftiest also in the Peloponnesus—is Mount Cyllene, in the n.e. (7,787 ft.). The chief river was anciently the Alpheius (q.v.). Originally A. was named Pelasgia, after its first inhabitants, the Pelasgi. Subsequently, it was divided into several small states which formed a confederation. Of these states, the chief were Mantinea, Tegea, Orchomenos, Pheneus, Psophis, and Megalopolis. The inhabitants, engaged chiefly in tending cattle and in hunting among the wild highlands, remained long in a state of barbarism. After civilization had advanced, and the Arcadians had become known by their love of music and dancing, they still retained some military spirit, and were sometimes engaged as mercenary soldiers. But generally their character accorded with their simple, rural mode of life; though it seems certain that human sacrifices were offered as late as the period of the Macedonian sway. The Arcadians were not remarkable for their intelligence. In fact, an 'Arcadian youth' was a synonym for a blockhead. Pan and Diana were their favorite deities. Ancient and modern poets (the latter especially in the time when 'pastorals' were popular) have described A. as the land of peace, innocence, and patriarchal simplicity of manners.

ARCADIAN, a. *ȧr-kā'dĭ-ăn,* pertaining to Arcadia, in the Peloponnesus; much used in poetry in the sense 'rural' or 'pastoral.'

ARCADIUS, *ȧr-kā'dĭ-ŭs:* first Emperor of the East; 383–408 (reigned 395–408); b. Spain; son of the emperor Theodosius, after whose death the Roman empire was divided into East and West. A. lived in oriental state and splendor, and his dominion extended from the Adriatic Sea to the river Tigris, and from Scythia to Ethiopia; but the real rulers over this vast empire were, first, the Gaul Rufinus, and afterwards the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while A. reposed in luxurious indifference. In 399, the eunuch Eutropius was deposed by another usurper, Gainas, who, in his turn, soon fell a victim to his own ambition. Afterwards, Eudoxia, the wife of the emperor, assumed the supremacy. One really great man adorned this period, the virtuous and eloquent Chrysostom, who was persecuted by Eudoxia, and through her influence exiled in 404, on account of his firm opposition to Arianism, which the empress herself favored. During the reign of A., his territories suffered by barbarian incursions, earthquakes, and famine, but nothing could disturb the indifference of the monarch. He died unlamented.

ARCANI DISCIPLINA (instruction in secret things): see MYSTAGOGUE, SECRET, DISCIPLINE OF THE.

ARCANUM, n. *âr-kā′nŭm*, plu. ARCA′NA [L. *arcānus*, secret, concealed]: thing secret, as if locked up. ARCANITE, n. *âr′kă-nīt*, a mineral, a colorless or white sulphate of potash, occurring mostly in crusts in lavas. See ROYAL ARCANUM.

ARCE, *ar′chā* (anc. *Arx*): t. of s. Italy, province of Caserta; 60 m. e.s.e. from Rome. It is situated on a hill near the Liris; and the summit, lofty and precipitous, is crowned by an interesting mediæval fortress called *Rocca d'Arce*. This fortress was considered impregnable till it was scaled and taken by the invading army of Charles of Anjou in 1266. Numerous inscriptions in which the name of Cicero occurs have been discovered near A.; and some ruins near the town are known as *L'aja di Cicerone*, or Cicero's Barn. Pop. about 2,000.

ARC, ELECTRIC: the luminous flame produced by the passage of electricity from one electrical conductor to another, the two not being in contact. The current must thus pass through the air from the one to the other, and this passage through the resistance offered by the air produces heat, which manifests itself in the vaporizing of the conducting pieces at these points where the current leaves one and enters the other. Small particles of the material of which the conductors are composed, also traverse the path through the air. The vapor and material particles being heated to incandescence, produce the brilliant flame observable in arc lamps. By reason of the magnetic effect of the current the path through the air space is not in a straight line directly from one conductor to the other, but is bent or curved in the form of the arc of a circle, hence the name given it.

ARCESILAUS, *âr-sĕs′ĭ-lā′ŭs:* B.C. 316—abt. 241; b. Pitane, in Æolia, Asia Minor: a Greek philosopher, founder of the New Academy. He studied philosophy, first under Theophrastus the Peripatetic, afterwards under Crantor. After the death of Crantor, A. became the chief master of the Academic party, or those who held to the doctrines of Plato; but he introduced so many modifications that its philosophic character was completely changed. His great rivals were the Stoics, whose opinions he attacked, but he does not appear to have attained any certainty in his own convictions. He had studied under too many masters, and discussed too many different systems, to be sure of the truth of any. He denied the Stoical doctrine of a 'convincing conception,' which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the existence of any sufficient criterion of truth, and recommended abstinence from all dogmatic judgments. In practice he maintained that we must act on grounds of probability. It is not easy to determine satisfactorily what his moral character was.

ARCH, n. *arch* [F. *arche*, an arch—from mid. L. *archĭă* the arch of a bridge: L. *arcus*, a bow, a curved line—lit., the circular part of any building]: the hollow or concave part of a bridge or gateway: V. to cover with an arch; to form an arch. ARCH'ING, imp. ARCHED, pp. *ârcht.* COURT OF ARCHES, n. *ârch'ĕz*, a very anc. court belonging to the Archbishop of Canterbury for deciding ecclesiastical matters, so called from the Church of St. Mary *le Bow*, or '*de ar'cubus.*' ARCH'WAY, a way or passage under an arch. TRIUMPHAL ARCH, a magnificent arched structure to commemorate the triumphant return of a conqueror, or to perpetuate some remarkable event.

ARCH, a. *ârch* [Ger. *arg*, morally bad: Dut. *erg*, wicked: Dan. *arrig*, ill-natured: Icel. *argr*, lazy, cowardly: AS. *earg*, bad]: bad and worthless; waggish; mirthful. ARCH'LY, ad *-lĭ*, shrewdly; roguishly. ARCH'NESS, n. humor with a touch of wicked pleasure; sly humor; waggishness.

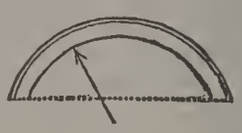
ARCH, a. *ârch* or *ârk* [Gr. *archos*, chief; *archein*, to be first: It. *arci:* Ger. *erz*, eminence, good or bad]: chief or principal; chief, or of the first class. ARCHANGEL, see below. ARCHBISHOP, n. *ârch-bĭsh'ŏp*, a chief bishop; a metropolitan having jurisdiction over the bishops of his province. ARCHBISH'OPRIC, n. *-rĭk*, the office, dignity, or see of an archbishop. ARCHI-EPISCOPAL, a. *âr'kĭ-ĕ-pĭs'kŏ-păl*, pertaining to. ARCHDEACON, n. *ârch-dē'kŏn*, one who assists the bishop in the government of his diocese. ARCHDEA'CONSHIP, n. the office of an archdeacon. ARCHDEACONRY, n. *ârch-dē'kŏn-rĭ*, the living. ARCHIDIACONAL, a. *âr'kĭ-dī-ăk'ŏ-năl*, pertaining to an archdeacon. ARCH-EN'EMY, n. a chief enemy; the evil one; the devil. ARCHDUKE, n. *ârch-dūk'*, a title of some foreign princes. ARCHDUCHESS, n. *-dŭch-ĕs*, his wife, sister, or daughter. ARCHDUCAL, a. *-dū'kăl*, of or belonging to an archduke. ARCH'MOCK, n. *-mŏk* [see ARCH 3, and Eng. *mock*]: in *OE.*, pre-eminent mockery. *Note.*—ARCH, followed by a consonant, is pronounced *ârch*, and by a vowel, *ârk*.

ARCH: an arrangement of bricks, stones, or other materials over an open space, by which they are made not only to support each other by mutual pressure, but to sustain a superincumbent weight. We have the excellent authority of Sir G. Wilkinson for stating that the A. was known to, and used by, the ancient Egyptians; and that the Assyrians were acquainted with its principles is placed beyond doubt by the arched gateways so frequently represented in their bass-reliefs. The A. is generally supposed to have been unknown to the Greeks—a supposition which becomes very improbable, if we hold it to be proved that it was used by nations with whose works they must have been familiar. But that the Greeks did not employ it generally in their architectural structures, is certain; and as it is not less certain that the Romans did, it is to the latter people that the nations of modern Europe are indebted for their acquaintance with its great utility. The introduction of the A. by the Romans gradually effected a complete revolution in the architectural forms which they borrowed from the Greeks.

The predominance of horizontal lines gave way by degrees, till, as the Romanesque passed into the Gothic style, it was superseded by the segments of a circle, placed generally more or less in a perpendicular direction. In its earliest application by the Romans, the A. did not spring from the entablature of the columns, but was generally placed behind them, and rested upon separate imposts. Subsequently, this arrangement was departed from, and the A. assumed the position which it has since retained above the columns; sometimes having an entablature interposed, and sometimes rising directly from the capital of the column or pier, as in the Romanesque. Before mentioning very briefly the different forms of the A., it seems natural to refer to a very simple structure, frequently met with in those early edifices in Britain which we are in the habit of designating as Saxon. It consists of two stones, their lower ends resting on rude piers, their tops leaning against each other, and thus forming two sides of a triangle, which is capable of supporting a moderate superincumbent weight. The mechanical principles on which the A. depends, though here very imperfectly employed, seem sufficiently called into play to suggest their more extensive application; and it is not impossible that out of this rude construction the A., in its later and more elaborate forms, might have developed itself without hints from foreign sources.

Of the A. itself, the following variations of form may be enumerated: The semicircle (1), the segment (2), the ellipse (3), which were the only forms employed by the ancients, and which alone were known in mediæval architecture before

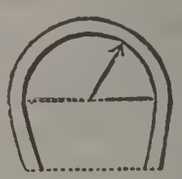
1. Semicircle.



2. Segment.

3. Ellipse.

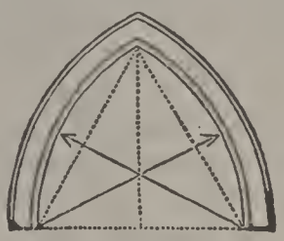
4. Stilted A.



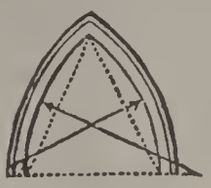
5. Horseshoe A.

the time at which the pointed A. was introduced. Of these, the stilted A. (4), and the horseshoe A. (5), are modifications, in both of which the centre or point from which the A. is described is above the line of the impost, but in the former of which the moldings are continued downwards vertically; while in the latter they are slightly inclined inwards, or the curve is prolonged till it meets the impost. The horseshoe A. belongs peculiarly to Arabian architecture (q.v.), not only from its having originated simultaneously with the faith of the Prophet, but from its continuing to be used exclusively by his followers. Next, in point of time, though far surpass-

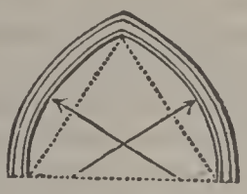
ing all the others in beauty and variety, is the pointed A. the origin of which is still a subject of antiquarian controversy. The greater or less acuteness of the pointed A. de



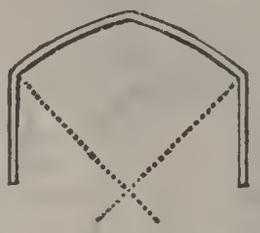
6. Equilateral A.



7. Lancet A.

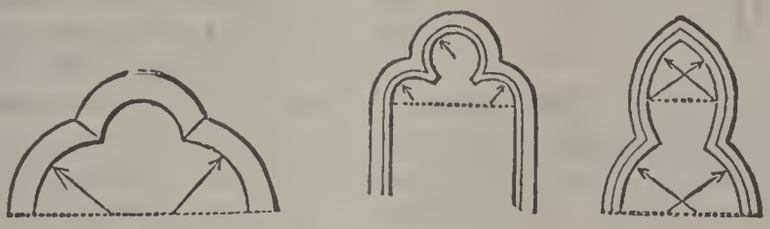


8. Drop A.



9. Segmental A.

pends on the position of the two centre points from which its curved sides are described. Its various proportions will



10, 11, 12, Trefoil Arches.

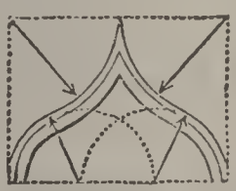
be better understood from the accompanying diagrams (6, 7, 8, 9) than from any verbal description.

Of the foil arches (10, 11, 12, 13, 14), or arches in which

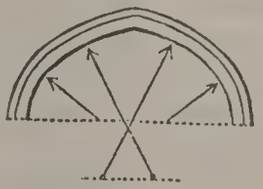
13. Cinquefoil A.

14. Polyfoil A.

the forms of a leaf are imitated, the first three are examples of the trefoil, the fourth of the cinquefoil, and the fifth of



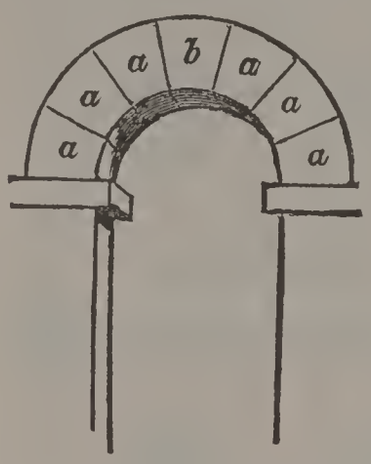
15. Ogee A.



16. Tudor A.

the polyfoil, the latter being found in Arabian and Roman

esque buildings. At a later period of Gothic architecture, with the decorated style, the ogee A. (15) was introduced, and the Tudor or four-cornered A. (16) appeared about the commencement of the perpendicular style. When first introduced, the proportions of this A. were bold and effective; but it was gradually depressed till the principle of the A. was lost, and its very form was again merged first in two and then in one flat stone or lintel over an opening. With the last form of the Tudor A. we thus reach almost the point of departure in the construction of the A., and complete our enumeration of its forms.



The sides of an A. are termed *haunches* or *flanks*, and its highest part is called the *crown*. The wedge-shaped stones, bricks, or other materials of which an A. is constructed are called *voussoirs* (*a*, *a*, *a*); the uppermost one of all (*b*) is called the *keystone;* the lowest, which is placed immediately over the impost, the *springer*, or springing-stone; the under or lower side of the voussoirs, the *intrados;* the upper side, the *extrados* or *back*. See BRIDGE: IMPOST: PIER: BUTTRESS.

ARCH, TRIUMPHAL: a structure erected by the Romans across roads, or at the entrance of cities, in honor of victorious generals. The original triumphal A. was the Porta Triumphalis, one of the gates of Rome through which the triumphal procession entered the city. Among the earliest detached arches built at Rome was that built by Scipio Africanus (B.C. 190) on the Capitoline Hill. Under the emperors, these structures became numerous and magnificent, and were decorated with bass-reliefs and inscriptions. Three of what were properly triumphal arches still remain in Rome, those, namely, of Titus, Septimius Severus, and Constantine. Numerous similar monuments exist in other parts of the old Roman empire, as at Rimini, Susa, Verona, Ancona, Orange (in France), Capura (in Spain).

Triumphal Arch of Constantine at Rome.

ARCHÆAN PERIOD, in Geology: otherwise known

as the Eozoic Era: the first system of rocks known to geologists. Although the Archæan rocks are the oldest known, they are not *primitive;* but, being stratified, are thus known to be sedimentary, the consolidated débris of still older rocks of which geologists know nothing. It is considered probable that these rocks were originally sands, clays, and limestones, later metamorphic: the sands being changed into quartzites, the clays into schists, gneiss, and even granites, and the limestones into marbles. It is noteworthy, however, that with these are associated two kinds of beds: iron ore and graphite. In Canada, the whole series of Archæan rocks is said to be as much as 40,000 ft. thick. It is a fact that the greatest beds of iron ore known in any strata are found in this system: thus the great iron-ore beds of Sweden, of Lake Superior, of New Jersey, and of the Iron Mountain of Missouri are in these rocks, as well as those immense ones recently discovered in s. Utah. The area covered by these rocks extends round the world, cropping out in some places as surface rocks, but mostly covered by the later formations. In N. Amer., it occupies in the n. a V-shaped space, and covers nearly the whole of Labrador, nearly all of Canada, enters New York at the Adirondacks, and extends n.w. into the Arctic regions. Another area includes the Blue Ridge and the e. slope of the Appalachian range extending from New England to Georgia. Involved in this system are the axes of certain of the other great mountain ranges, as the Colorado, Park, and Wahsatch, and possibly the Sierra Nevada. There are also some isolated instances, including one in Texas and one in Missouri. In Europe these rocks are found in the n.w. of Scotland; in Norway, Sweden, and Russia; in Bohemia and Bavaria, and among the Alps and the Carpathians. From the fact that these rocks are stratified, it is known that they were all at one time covered with water. There is reason to believe that they contained the lowest forms of vegetable and animal life, though this has never been demonstrated. The enormous thickness of the Archæan rocks, they being probably equal to all later rocks together, represents an amount of time perhaps equal to all the rest of the recorded geological history of the earth. See EOZOON.

ARCHÆOCIDARIS, n. *ȧr'kē-ō-sĭd'ȧr-ĭs* [Gr. *archaĭ'os*, ancient: Gr. *kid'aris:* L. *cid'aris*, a turban]: the sea-egg; a genus of fossil sea-urchins characterized by their small hexagonal plates and long spines.

ARCHÆOLOGY, n. *ȧr'kē-ŏl'ŏ-jĭ*, or ARCHEOLOGY, n. *ȧr'kē-ŏl-ŏ-jĭ* [Gr. *archaĭ'os*, ancient; *logos*, discourse]: the science that treats of ancient things or antiquities; knowledge about ancient art, particularly of the middle ages. AR'CHÆOL'OGIST, n. one skilled in ancient things and learning. ARCHÆOLOGICAL, a. *ȧr'kē-ō-lŏj'ĭ-kăl*, pertaining to. AR'CHÆOLOG'ICALLY, ad. *-lĭ*.

ARCHÆOLOGY: (*ȧr-ke-ŏl'ō-jĭ*): the branch of research which deals with the past history of the human race, as

exemplified in relics of man's industry and other objective traces of his presence apart from written records, tradition, and the memory of the living. Even written records pertaining to prehistoric peoples and cultures, as well as those of historic nations requiring special decipherment, may be classed among the resources of the archæologist. The data thus made available to the historian are in general supplementary to written or documentary records and enable him to follow backward along the course of human progress to the very inception of culture. Researches relating to the early history of classical nations were the first to be seriously undertaken and are referred to as classical archæology. When the investigations extend to the elucidation of historical nations generally, they are sometimes referred to as historical archæology. General archæology, which is a creation of the 19th c., originated, on one hand, from the decipherment of the Egyptian hieroglyphics, revealing a remote history, implying a still more remote one, and causing scholars to realize for the first time how futile are the distorted scraps of classical tradition. This was followed by excavations in Mesopotamia, which uncovered the remains of Assyrian culture, and by the decipherment of the cuneiform characters. On the other hand, it sprung from the examination of relics of ancient man in burial mounds, kitchen middens, lake dwellings, caverns, and river drift, carrying his history far back into the geological ages. This branch is known as prehistoric archæology.

These various branches of investigation, followed with ever increasing zest, have gradually resulted in the accumulation of a vast storehouse of verified knowledge, revolutionary in a large measure to accepted views regarding the origin and history of the human race. Briefly, archæologic research has shown that civilization is not a sudden growth of a few dozen centuries from a single center and a single people, but a gradual evolution through long ages and among many peoples.

There are many stages of culture which archæology has found convenient to classify wholly according to the material and construction of the implements in use, these having in fact accompanied and determined with great accuracy a corresponding set of changes in industrial arts and even social development. Accordingly it divides human progress into the Eolithic ('Stone-Dawn'), the Palæolithic or Old Stone, the Neolithic or New Stone, the Bronze, and the Iron Ages; a portion of these being still further subdivided.

For vast epochs after the appearance of man upon the earth, no record of his presence exists or can exist except a palæolontological one—his bones. He doubtless wrenched off tree-branches and threw and hammered with stones, like the higher simians, but we cannot prove a broken branch or scratches on a stone to be artificial, or due to man rather than to orang.

The first stage of real culture, as identified in Europe is

the Eolithic Age. This age is characterized by the use of flints very roughly hammered into an edge that would bruise off a stick or into a grip for the hand; so roughly, indeed, that their having received deliberate art at all was bitterly contested. The flints are found, especially in Kent, England, in river deposits on the top of hills 600 feet above the present stream-beds, which must therefore have been excavated since. Even in this remote antiquity man was no new organism on the earth, and this stage of culture, from the excessive slowness of progress in the early stages, must have lasted for a long period.

The Palæolithic Age succeeded; the former till recently was reckoned a part of it. It is now further divided into two chief periods, from the anthropological differences implied, those of the river gravels and of the cave-dwellers; and the latter again into three others, with well-marked stages of culture. More specifically:

1. River gravels up to 200 feet above present beds ('Achuleen'). The remains are massive flints scarcely less rude than the former, but unmistakably worked. They still antedate any permanent dwelling or shelter.

2. Cave-dwellers. Man has now a permanent though not artificial dwelling, and the germ of family life is born. (1) 'Mousterien': Flint flakes split off (the first true artificial tool), and massive flints hammered into definite shapes, with others rude like the former. (2) 'Solutrien': Flints carefully worked and finely shaped. (3) 'Magdalenien': Well-shaped flint tools, plentiful bone-working with them, and drawings on implement sand the walls of caves.

All these remains have been found along with fossils of the mammoth, cave-bear, cave-lion, sabre-toothed tiger, and other extinct forms, in ancient river deposits, deep under stalagmitic accumulations in caves, beneath American lavabeds, etc. The age assigned to these deposits by geologists is from 100,000 to 300,000 years.

The Neolithic Age is the evident beginning of modern life, made possible by improved working tools. The remains of this period are not buried under geologic deposits, but lie on or near the surface. They are no longer merely hammered or chipped, but rubbed or ground to shape, giving a sharper edge and a smoother surface. There is a gradual advance in the best specimens to weapons and tools almost equal to metal, such as lance-heads, arrow-heads, knives, daggers, awls, chisels, and axes of razor-like sharpness, and needle points, serviceable for and accompanied by highly-developed arts and manufactures, agriculture, and navigation, of remarkable magnitude and variety. As timber could now be easily cut, men built large wooden dwellings and rowing galleys. Early in the period we find immense earthworks both for defense and for burial; later, in the cities, brick architecture and fine engineering.

The Bronze Age, however, was an enormous step forward. It was earlier in Assyria than Egypt, probably

from the Armenian copper: the former introduced it by 5000 B. C.; the latter not fully till about 3000, and did not use it freely till 1600, only 500 years or so before iron displaced it. At first the stone tools and implements were simply copied in massive bronze, and were needlessly heavy and limited in pattern. But as properties of bronze became evident the tools were much lightened, and made thin yet stiff with embossed patterns, and various kinds invented which could not have been made in stone, as the sickle, gouge, etc. The axe, or celt, was first made as a plain bronze wedge fastened by a thong, as with stone; then cast with a socket for the helve, an extraordinary gain in efficiency. There were light cups and kettles, knives, and chisels, spear-and-arrow-heads, swords and daggers, and bronze-bound shields, and a mass of personal fastenings and adornments. The industrial advantage of this newly found hardness, toughness, and variety developed industries and trade immensely; it also made possible for the first time true stone architecture, and engineering of hewn and dressed stone.

The Iron Age is the present (though the 19th c. developed what is really a distinct era, the Steel Age, making possible many advances beyond the mere iron), and the most of its course belongs to history. It originated from about 1200 to 1000 B. C.,—that period, in which lies the birth of perhaps the three greatest factors of human progress in historic times,—the use of iron, the alphabet, and the Hebrew nation.

The civilization of the Mesopotamian plain is not only the oldest in the world so far as known, but the first (unless with the possible exception of Egypt) where men settled in great city communities under an orderly government with a developed religion, practising agriculture by irrigation, erecting adobe buildings, and using a syllabified writing. The earliest researches in this region—those of J. B. Rich, Indian consul-general at Bagdad, in 1818-20, who collected sculptures and outlined Assyrian art; the excavations by the French consul Botta at Khorsabad in 1843, of Nimrud and Ninevah by Layard in 1845-51, and Hormuzd Rassam in 1854—were of relatively modern Assyrian sites. The first entrance on the ancient Babylonian civilization was made at Erech (1849-52) by Loftus; a further one by Sarzac in the important Tello excavations of 1876-81; but by far the most important was by the Americans, Peters and Haynes, with Hilprecht, at Nippur from 1889 down. See ASSYRIA; BABYLON.

The archæological history of prehistoric civilizations was studied in Egypt earlier, and has been studied there more fully, than elsewhere, from the accessibility of relics and safety of work, the involution of Egyptian politics and history with records in a classic language through the existence of an Egyptian state under the classic rulers, and the survival of a descendant of the Egyptian language to our own day. It was the latter which furnished the key to the decipherment of the hieroglyphic records. The

Rosetta Stone, bearing a proclamation in hieroglyphic, demotic and Greek, discovered by the French in 1799, made possible the deciphering of many important inscriptions, while the excavations at Thebes in 1820-30 opened up the Ramesside and neighboring periods 1500-1000 B. C. Later, Lepsius and Mariette were foremost in revealing the period of the Pyramid-Builders, carrying us back to far past 3000 B. C.; and still later Dr. Flinders Petrie has not only turned the First Dynasty and others still farther back, from myth into solid history, but has recreated the prehistoric world prior to the organization of the monarchy, about 4800 B. C., with a surety as great as that of written record. See EGYPT.

Till the very recent excavations at Troy, Mycenæ, etc., resulting from enthusiasm for the Homeric poems, archæological research in the classic lands was mostly confined to illustrating historical periods, and to a study of Greek and Roman art and architecture; even now the light on prehistoric times is not from written records and inscriptions as in the East, but inferential from material objects. It has, however, in confirmation of Egyptian and other records, and by comparison of objects with those of known date in that country and Babylonia, given unmistakable proof of a hitherto unsuspected stratum of old Greek history. From foreign pottery found in Egypt, 5000-3000 B. C., Greece and Italy probably had a Neolithic pottery-making population at those times. But the first positive beginning of civilized settlement is in the lowest Troy, dating certainly before 2000 B. C., and perhaps 3000: almost no metal is found there. Still before 2000 is another Troy, with fine vases and golden ornaments. This was contemporary with the supremacy of Crete, then the mistress of the seas, as the Etruscans and Phœnicians were later; and there was a direct connection between Crete and Troy. Three times after this was Troy abandoned and rebuilt before the contemporary of the Mycenæan kingdom of about 1500 B. C. is reached, which, in turn, gave place to the civilization of Athens. See ATHENS; GREECE.

The development of civilization was very much later in Italy than in Greece, and more slowly affected by outside civilizations except on the southern coast. The Neolithic Age, with black pottery and lake dwellings, lasted down to nearly or quite 1000 B. C., the full development of the Bronze Age not taking place till about 800. The Etruscan invasion, which tradition brings from Asia Minor, cannot be dated, but was probably later than 1000 B. C. The art and religion of the Etruscans were entirely foreign; their one great specialty was engineering; but their history and affiliations remain a mystery chiefly because their language is such. See ETRUSCANS; ITALY.

In America archæology is the almost exclusive reliance of the historian in treating of pre-Columbian peoples and culture. It has served to carry the story of the native tribes far back into the past, although the record furnished by the various classes of remains grows rapidly less

legible as we pass beyond the few well-illumined pages of the historic period. In no part of America are there remains of man or his works clearly indicating the presence of peoples distinct from the Indian and the Eskimo or having culture markedly distinct in kind and degree from those characterizing the aborigines of post-Columbian times. It is now known that a sedentary condition prevailed among the aborigines to a much larger extent than has generally been supposed. The more advanced nations of middle and South America have been practically stationary for long periods, as indicated by the magnitude of their architectural achievements, and even such primitive groups as the Iroquois, Algonquian (q. v.), and others of North America have occupied their general historic habitat for unnumbered generations. The prehistoric remains of the various regions thus pertain in large measure to the ancestors of the historic occupants, and the record is thus much more simple than that of prehistoric Europe.

At the period of discovery the aborigines had made noteworthy progress in a number of centres where apparently the conditions had conspired to promote culture growth. Foremost among these were southern Mexico, Yucatan, Guatemala, Honduras, and a vast region in South America, with Peru as the centre. In these areas extensive cities had arisen and a state of culture existed already well within the lower status of civilization, as distinguished from the barbarian culture characteristic of the great body of the American race. Spanish historians have left inadequate records of these peoples and their works, but archæological researches are now furnishing a vast store of knowledge of the achievements of these nations and more especially of their arts, which include in some cases systems of glyphic writing of remarkable perfection, although still in a large measure undeciphered. Outside of the great centres of progress many tribes had made striking progress, and the antiquities of northern Mexico, Nicaragua, Costa Rica, Columbia, Brazil, Chile, and Argentine are of exceeding interest.

Within the area of the United States pre-Columbian progress was greatest in two principal regions: (1) The Mississippi valley, including portions of the Southern states farther eastward, and (2) the Pueblo country, comprising New Mexico, Arizona, and parts of Colorado, Utah, and Texas. The first-mentioned area is characterized by remains of extensive fixed works, such as mounds and fortifications; the second by its ruined pueblos of stone and adobe. In the remainder of the area, as on the Atlantic and Pacific slopes and in the regions of the Great Lakes, the northern Rocky mountains, and the Great Basin, there is comparatively little save minor movable relics and kitchen deposits to mark earlier occupancy. The fixed works which occur in the first-mentioned region are very numerous, and are extremely important to the student of native history. In the Missis-

sippi valley and the Southern states these works consist of mounds of diversified shapes, built mainly of earth and devoted to a variety of purposes, such as dwelling, observation, defense, burial, and ceremony. These works indicate the former presence in the region of a numerous sedentary population relying mainly on agriculture for subsistence. It is now known, as a result of the more recent archæological investigations, that these people, often called the 'Mound-builders' (q. v.), were no other than Indians, and in some cases at least the ancestors of tribes occupying the general region within historic times.

In the Pueblo region the fixed works consist of villages and dwellings of stone, and, in the southern Pueblo area, of adobe. Of unusual interest are the cliff-dwellings, built of stone in rifts and shelters in the canyon walls and along the faces of the tablelands or excavated in friable cliffs. The advanced condition of the earlier occupants of the region is indicated not only by these remains but by the presence of traces of extensive irrigating ditches. A careful study of these various remains, including the skeletal parts, demonstrates the fact that they pertain in large measure to the ancestors of the present occupants of the Pueblo towns and that no antecedent distinct people or culture can be differentiated.

In the districts lying outside of the areas referred to above are encountered occasional burial mounds and earthworks, as well as countless refuse deposits marking occupied sites. The most notable of the latter are the shell mounds of the Atlantic and Pacific shore lines, which offer a rich reward for the labors of the archæologist.

Among fixed works of somewhat wide distribution are the quarries where flint, soapstone, mica, quartzite, obsidian, and other varieties of stone were obtained for the manufacture of the implements and utensils. Caverns formerly occupied by the tribes also contain deposits of refuse, and their walls display numerous examples of pictography. In connection with fixed works may also be mentioned the petroglyphs, or rock inscriptions, found in nearly every part of the country. These give little aid, however, to the study of aboriginal history, since they can not be interpreted, save in rare cases where tradition has kept the significance alive.

Knowledge of native history in post-Columbian as well as in pre-Columbian times is greatly enhanced by a study of the minor remains and relics—the implements, utensils, ornaments, ceremonial and diversional objects and appliances—great numbers of which are now preserved in our museums.

Efforts have been made to distinguish definite stages of culture progress in America corresponding to those established in Europe, but there appears to be no very close correspondence. The use of stone was universal among the tribes, and chipped and polished implements appear to have been employed at all periods and by peoples of every stage of culture, although the polishing

processes seem to have grown relatively more important with advancing culture, being capable of producing art works of the higher grades, while flaking processes are not. Some of the more advanced tribes of the South were making marked headway in the use of metals, but the culture was everywhere essentially that of polished stone.

The antiquity of man on the American continent is a subject of interest to the student of the aborigines as well as to the historian of the human race, and the various problems that arise with respect to it in the regions n. of Mexico are receiving much scientific attention. As the tribes were without a system of writing available to scholars, knowledge of events that transpired before the Columbian discovery is limited to the rather indefinite testimony furnished by tradition, by the more definite but as yet fragmentary evidences of archæology, and by the internal evidence of general ethnological phenomena. The fact that the American Indians have acquired such marked physical characteristics as to be regarded as a separate race of very considerable homogeneity from Alaska to Patagonia, is regarded as indicating a long and complete separation from their parental peoples. Similarly, the existence in America of numerous culture groups, measurably distinct one from another in language, social customs, religion, technology, and esthetics, is thought to indicate a long and more or less exclusive occupancy of independent areas. But as a criterion of age the testimony thus furnished lacks definiteness, since to one mind it may signify a short time, while to another it may suggest a very long period. Native historical records of even the most advanced tribes are hardly more to be relied on than tradition, and they prove of little service in determining the duration of occupancy of the continent by the race, or even in tracing the more recent course of events connected with the historic peoples. No one can speak with assurance, on the authority of either tradition or history, of events dating farther back than a few hundred years. Archæology, however, can furnish definite data with respect to antiquity; and, aided by geology and biology, this science is furnishing results of great value, although some of the greater problems encountered remain still unsolved, and must so remain indefinitely. During the first centuries of European occupancy of the continent, beliefs in the derivation of the native tribes from some Old World people in comparatively recent times was very general, and indeed the fallacy has not yet been entirely extinguished. This view was based on the apparently solid foundation of the Mosaic record and chronology as determined by Usher, and many works have been written in the attempt to determine the particular people from which the American tribes sprang. (For various references consult Bancroft, *Native Races*, V., 1886; Winsor, *Narrative and Critical History*, I., 1884.) The results of researches into the prehistoric archæology of the eastern continent during the last century, however, have cleared away the

Usherian interpretation of events and established the fact of the great antiquity of man in the world. Later, investigations in America were taken up, and the conclusion was reached that the course of primitive history had been about the same on both continents. Observations that seemed to substantiate this conclusion were soon forthcoming and were readily accepted; but a more critical examination of the testimony shows its shortcomings and tends to hold final determinations in abeyance. It is clear that traces of early man are not so plentiful in America as in Europe, and investigations have proceeded with painful slowness and much halting along the various lines of research. Attempts have been made to establish a chronology of events in various ways, but without definite result. The magnitude of the work accomplished in the building of mounds and other earthworks has been emphasized, the time requisite for the growth and decay upon these works of a succession of forests has been computed. The vast accumulations of midden deposits and the fact that the strata composing them seem to indicate a succession of occupancies by tribes of gradually advancing culture, beginning in savagery and ending in well-advanced barbarism, have impressed themselves on chronologists. Striking physiographic mutations, such as changes of level and the consequent retreat or advance of the sea and changes in river courses since man began to dwell along their shores, have been carefully considered. Modifications of particular species of mollusks between the time of their first use on the shell-heap sites and the present time, and the development in one or more cases of new varieties, suggest very considerable antiquity. But the highest estimate of elapsed time based on these evidences does not exceed a few thousand years. Dall, after carefully weighing the evidence collected by himself in Alaska, reached the conclusion that the earliest midden deposits of the Aleutian islands are probably as much as 3,000 years old. Going beyond this limit, the geological chronology must be appealed to, and we find no criteria by means of which calculations can be made in years until we reach the close of the Glacial epoch, which, according to those who venture to make estimates based on the erosion of river channels, was, in the states that border the St. Lawrence basin, not more than 8,000 or 10,000 years ago (Winchell). Within this period, which in middle North America may properly be designated post-Glacial, there have been reported numerous traces of man so associated with the deposits of that time as to make them measurably valuable in chronological studies; but these evidences come within the province of the geologist rather than of the archæologist, and findings not subjected to critical examination by geologists having special training in the particular field may well be placed in the doubtful category.

Post-Glacial rivers, in cutting their channels through the various deposits to their present level, have in some

cases left a succession of flood-plain terraces in which remains of man and his works are embedded. These terraces afford rather imperfect means of subdividing post-Glacial time, but under discriminating observation may be expected to furnish valuable data to the chronologist. The river terraces at Trenton, N. J., for example, formed largely of gravels accumulated at the period when the southern margin of the ice sheet was retreating northward beyond the Delaware valley, have been the subject of careful and prolonged investigation. At the points where traces of man have been reported the section of these deposits shows generally beneath the soil a few feet of superficial sands of uncertain age, passing down rather abruptly into a more or less uniform deposit of coarse gravel that reaches in places a depth of 30 feet or more. On and near the surface are found village sites and other traces of occupancy by the Indian tribes. Beneath the soil, extending throughout the sand layers, stone implements and the refuse of implement-making occur; but the testimony of these finds can have little value in chronology, since the age of the deposits inclosing them remains in doubt. From the Glacial gravels proper there has been recovered a single object to which weight as evidence of human presence during their accumulation is attached; this is a tubular bone, regarded as part of a human femur and said to show glacial striæ and traces of human workmanship, found at a depth of 21 feet. On this object the claim for the Glacial antiquity of man in the Delaware valley and on the Atlantic slope practically rests (Putnam, Mercer, Wright, Abbott, Hrdlicka, Holmes). Other finds east of the Alleghanies lacking scientific verification furnish no reliable index of time. In a post-Glacial terrace on the south shore of Lake Ontario the remains of a hearth were discovered at a depth of 22 feet by Mr. Tomlinson in digging a well, apparently indicating early aboriginal occupancy of the St. Lawrence basin (Gilbert). From the Glacial or immediately post-Glacial deposits of Ohio a number of articles of human workmanship have been reported: A grooved ax from a well 22 feet beneath the surface, near New London (Claypole); a chipped object of waster type at Newcomerstown, at a depth of 16 feet in Glacial gravels (Wright Holmes); chipped stones in gravels, on at Madisonville at a depth of 8 feet, and another at Loveland at a depth of 30 feet (Metz, Putnam, Wright, Holmes). At Little Falls, Minn., flood-plain deposits of sand and gravel are found to contain many artificial objects of quartz. This flood plain is believed by some to have been finally abandoned by the Mississippi well back toward the close of the Glacial period in the valley (Brower, Winchell, Upham), but that these finds warrant definite conclusions as to time is seriously questioned by Chamberlin. In a Missouri river bench near Lansing, Kans., portions of a human skeleton were recently found at a depth of 20 feet, but geologists are not agreed as to the age of the formation. At Clayton, Mo., in a deposit believed to

belong to the loess, at a depth of 14 feet, a well-finished grooved ax was found (Peterson). In the Basin Range region between the Rocky mts. and the Sierras, two discoveries that seem to bear on the antiquity of human occupancy have been reported: In a silt deposit in Walker river valley, Nev., believed to be of Glacial age, an obsidian implement was obtained at a depth of 25 feet (McGee); at Nampa, Idaho, a clay image is reported to have been brought up by a sand pump from a depth of 320 feet in alternating beds of clay and quicksand underlying a lava flow of late Tertiary or early Glacial age (Wright, Emmons). Questions are raised by a number of geologists respecting the value of these finds (McGee). The most extraordinary discoveries of human remains in connection with geological formations are those from the auriferous gravels of California (Whitney, Holmes). These finds are numerous and are reported from many localities and from deposits covering a wide range of time. So convincing did the evidence appear to Whitney, state geologist of California from 1860 to 1874, that he accepted without hesitation the conclusion that man had occupied the auriferous gravel region during pre-glacial time, and other students of the subject still regard the testimony as convincing; but consideration of the extraordinary nature of the conclusions dependent on this evidence should cause even the most sanguine advocate of great human antiquity in America to hesitate. Geologists are practically agreed that the gravels from which some at least of the relics of man are said to come are of Tertiary age. These relics represent a polished-stone culture corresponding closely to that of the modern tribes of the Pacific slope. Thus, man in America must have passed through the savage and well into the barbarous stage while the hypothetical earliest representative of the human race in the Old World, *Pithecanthropus erectus* of Dubois, was still running wild in the forest of Java, a half-regenerate Simian. Furthermore, the acceptance of the auriferous-gravel testimony makes it necessary to place the presence of man in America far back toward the beginning of the Tertiary age, a period to be reckoned not in tens but in hundreds of thousands of years. (Consult Smithson. Rep. for 1899.) These and other equally striking considerations suggest the wisdom of formulating conclusions with the utmost caution.

Caves and rock shelters representing various periods and offering dwelling places to the tribes that have come and gone, may reasonably be expected to contain traces of the peoples of all periods of occupancy; but the deposits forming their floors, with few exceptions, have not been very fully examined, and up to the present time have furnished no very tangible evidence of the presence of men beyond the limited period of the American Indian as known to us. The University of California has conducted excavations in a cave in the north part of the state, and the discovery of bones that appear to have been shaped by human hands, associated with fossil fauna that probably

represent early Glacial times, has been reported (Sinclair); but the result is not decisive. The apparent absence or dearth of ancient human remains in the caves of the country furnishes one of the strongest reasons for critically examining all testimony bearing on antiquity about which reasonable doubt can be raised. It is incredible that primitive man should have inhabited a country of caverns for ages without resorting at some period to their hospitable shelter; but research in this field is hardly begun, and evidence of a more conclusive nature may yet be forthcoming.

In view of the extent of the researches carried on in various fields with the object of adducing evidence on which to base a scheme of human chronology in America, decisive results are surprisingly meager, and the finds so far made, reputed to represent a vast period of time, stretching forward from the middle Tertiary to the present are characterized by so many defects of observation and record and so many apparent incongruities, biological, geological, and cultural, that the task of the chronologist is still largely before him.

ARCHÆOPTERYX, n. *âr'kē-ŏp'tĕr-ĭks* [Gr. *archai'os, pterux,* a wing]: an extinct bird exhibiting many reptilian characters, especially in having jaws provided with teeth and a long tail of many vertebræ; and it constitutes a link between birds and reptiles. It lived during the Jurassic period, and is by far the most ancient bird known. Its distinctness from all other birds is expressed by placing it by itself in a separate sub-class. The Archæornithes birds are the rarest of fossils, and this one is known only from two skeletons and a single feather, all preserved in the lithographic limestone quarries of Solenhofen, Bavaria. The skeletons, one in the British, the other in the Berlin Museum, are wonderfully well preserved in the fine smooth-grained stone, and have the impressions of the feathers in their natural position. They show that the Archæopteryx had short wings with primary and secondary feathers arranged much as in modern birds; but the bones of the wing are not so specialized for their peculiar use as in modern birds; the metacarpal bones are separate and the digits free and complete, each with a claw on its tip, while in modern birds the first and third digits are rudimentary and the metacarpals fused into a single bone. The long tail of 23 separate vertebræ has the feathers arranged in pairs springing from the sides of each vertebra except toward the tip; in modern birds the tail-feathers spring from a triangular bony plate at the end of the short rudimentary tail. (See Birds.) The teeth are like those of many lizards, sharp and conical.

ARCHAISM, n. *âr'kā-ĭzm* [Gr. *archai'os,* ancient—from *archē,* beginning]: an ancient expression, or one not now used. Archaic, a. *âr-kā'ĭk,* or Archa'ical, a. *-ĭ-kŭl,* ancient; peculiar to remote antiquity; obsolete.

ARCHANGEL, n. *ârk-ān'jĕl* [Gr. *archang'gelos,* an archangel—from *archos,* a chief; *ang'gĕlos,* a messenger]: an

angel of the highest order. ARCH'ANGEL'IC, a. *jĕl'ĭk*, pertaining to. *Note.*—Most of the other words beginning with *arch* are to be looked for under the simple words; ARCH, always meaning *chief, of the first class*—as ARCHBISHOP, the chief bishop.

ARCHANGEL, *ârk-ān'jĕl:* the chief city in the Russian dept. of Archangel; in lat. 64° 32′ n., and long. 40° 33′ e., about 40 m. above the junction of the river Dwina with the White Sea; the seat of an archbishop. Its name is taken from the monastery of St. Michael. A. is the chief commercial city for the n. of Russia and Siberia, and is visited by numerous vessels—especially British—from July to September, the port being clear of ice only during that period. The houses are built chiefly of wood, and their general appearance is far from handsome. The finest edifices are the bazaar or mart, and the marine hospital. A. has an ecclesiastical college, schools for engineering and navigation, etc. The chief articles of traffic are fish, train-oil, skins, furs, timber, wax, iron, tallow, bristles, caviare. The town, which is the oldest seaport of the empire, and was for a long period the only one, was founded in 1584. During summer, A. has a continual market. Pop. 20,933.

The government of A. has an area of 331,600 sq. m.; pop. 347,509.

ARCHAN'GEL: a term which occurs in the New Test.; and which, according to some, is there a title of our Saviour—but is usually considered to designate an angel superior in power and glory to the other angels. We read in the Epistle of Jude of 'Michael the A.,' and in Rev. xii. 7, of 'Michael and his angels.' In 1 Thess. iv. 16, we are told that the coming of our Lord at the last day shall be 'with the voice of the A., and with the trump of God.' We nowhere read in the Holy Scriptures of *archangels*, although the plural is popularly as much used as the singular. The notion of an angelic hierarchy certainly prevailed among the Jews, the highest place being assigned to Michael; and the same notion has extensively prevailed in the Christian Church. There are passages of Scripture which seem to indicate different degrees and classes among the angelic hosts, but no clear revelation has been made upon this subject.

ARCHBISHOP, *ârch-bĭsh'ŏp* [Gr. *arch*, and *episcopos*, overseer]: the title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province, and also exercises episcopal authority in his own diocese. The title arose in the 3d and 4th centuries, from the provincial synods being held once or twice a year in the chief town of the province under the presidency of the bishop of the place. Another cause of the origin of the title is said to be the custom of planting new bishoprics as Christianity spread, a slight supremacy being still retained by the original over the newly appointed chief pastors. In the Oriental Church the archbishops are still called 'metropolitans,

from the circumstance first mentioned. In the African Church, on the other hand, the term used was 'primus.' The great archbishopries of the early church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the 6th c., the A. of Rome has assumed the name of pope (papa). There is an official letter by Justinian, addressed to 'John, A. of Rome and Patriarch'; and several ecclesiastical constitutions are addressed to 'Epiphanius, A. of Constantinople and Patriarch.' The synod of Antioch, 341, assigned to the A. the superintendence over all the bishopries, and a precedence in rank over all the bishops of the church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose out of this superiority of rank privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the patriarchs (q.v.) towards the end of the 4th and during the 5th centuries, and still more to the pope in the 9th. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honor of having the cross carried before them in their own archiepiscopate, even in presence of the pope himself, and of wearing the *pallium*. In England, there are two archbishops of the Church of England, of whom one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though, as ruling over a province in place of a single diocese, both have held the rank of metropolitans from the first, the A. of Canterbury has all along had precedence, not merely as the successor of Augustine and the senior A., but as possessing a pre-eminent and universal authority over the whole kingdom. This pre-eminence is marked in the titles which they respectively assume—the A. of Canterbury being styled the primate of all England (*metropolitanus et primas totius Angliæ*), while the A. of York is simply called primate of England (*primas et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the A of Canterbury, who has precedence of all the nobility, not only preceding the A. of York, but the lord chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland the authority of the A. of Canterbury extended to that island. The amount of control which belongs to an A. over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese, or is guilty of immorality, the A. may call him to account, and even deprive him. In 1822, the A. of Armagh, who is primate of all Ireland, deposed the Bishop of Clogher on the latter ground. To the A. of Canterbury belongs the honor of placing the crown on the sovereign's

head at his coronation; and the A. of York claims the like privilege in the case of the queen-consort, whose perpetual chaplain he is. The province of the A. of York, consisting of the six northern counties and Cheshire, includes 9 dioceses. The rest of England, with Wales, forms the province of the A. of Canterbury, and includes 24 dioceses. The dioceses of the two archbishops—i.e., the districts in which they exercise ordinary episcopal functions—were remodelled by 6 and 7 Will. IV. c. 77. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called 'peculiars;' with small districts in other dioceses, particularly London. The diocese of the A. of York embraces the county of York, except that portion of it now included in the dioceses of Ripon and Manchester, and some other detached districts.

In Ireland, there are two Protestant and four Roman Catholic archbishops. Of the former, the A. of Armagh is primate of all Ireland; the A. of Dublin being primate of Ireland. They formerly sat alternately in the house of lords; the three bishops who, with them, represented the Church of Ireland being chosen by rotation. The election of an A. does not differ from that of a bishop (see BISHOP); but when he is invested with his office, he is said to be 'enthroned,' whereas a bishop is 'consecrated.' He also writes himself 'by Divine Providence'; a bishop being 'by Divine permission'; and has the title of 'Grace,' and 'Most Reverend Father in God,' while a bishop is styled 'Lord,' and 'Right Reverend Father in God.' The A. is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled up within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the A. of the next avoidance of one such dignity or benefice belonging to his see as the A. shall choose.

In the Prot. Epis. Church in the United States, there are no archbishops. There are in the United States 14 archbishops of the Rom. Cath. Church.

ARCHDEACON, *ârch-dē'kŏn* [Gr. *arch*, and *diaconos*, servant]: an ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop The A. originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church, and directing the deacons in their duties. From being thus mere assistants, archdeacons in the 5th c. began to share the bishop's powers, and step by step attained to the authority which they now enjoy, which from the 9th c. became in many respects distinct from that of the bishop. Several synods protested against the innovation, but it was continued in the 11th and 12th centuries, when the archdeacons were recognized as the most influential of prelates. In the 13th c., their powers were limited by the establishment of episcopal courts. Their dignity and influence is now very much reduced in the Rom. Cath. Church. There were formerly 60 archdeaconries in England, but their

number has been considerably increased since the passing of the act for carrying into effect the report of the Ecclesiastical Commissioners (6 and 7 Will. IV. c. 77); and it is probable that under the provisions of that act they may be still further increased. No person can be appointed an A. till he has been six years complete in priest's orders (3 and 4 Vict. c. 113, s. 27). The duty of parochial visitation has long been regarded as belonging specially to the archidiaconal office, and it was by its exercise mainly that the archdeacons attained to the dignity of ordinary instead of delegated jurisdiction. Even in performing this function, however, and in holding general synods or visitations, ordering repairs of churches, and the like, the A. is properly to be regarded as being what the canon law called him, 'the bishop's eye.' The judge of the A.'s court, when he does not preside, is called 'the official.' There is an appeal to the Court of the Bishop, or in the case of an A. of an archbishopric, to the Court of Arches. See DEACON: DEAN: PRIEST. See also Cripp's *Law Relating to the Church and Clergy*.

ARCHDUKE′: a title now taken by all the sons (Archduchess by all the daughters) of the emperor of Austria, and by their descendants through the male line. The title of A. was gradually assumed by the dukes of Austria, as a mark of precedence over the other dukes of the empire. Duke Rudolph IV. of Austria, in 1359, called himself Palatinus Archidux, but he was not so styled by the emperor. His brothers, Albert and Leopold, did not assume the title after his death, though they had occasionally done so in his lifetime. The third son of Leopold, however, Ernest the-Iron, revived it. Still he was addressed by the emperor simply as duke. At last the title was formally conferred on them by the emperor Frederick III. in 1453, who himself, as duke, was the first recipient of the imperial gift. Still the usage was not uniform, for he afterwards speaks of himself as duke. The privilege was extended to the Tyrolian branch of the Austrian House in the person of Sigismund. The value of the dignity thus assumed was a cause of contention with Bavaria in 1589. The Austrian view was, that to duke it held the same relation that archbishop does to bishop. The dukes of Austria claimed to have always had precedence over the other ducal houses, and regarded the title as a mere indication of what had been universally acknowledged. Bavaria, on the other hand, relied on the greater antiquity of its dukedom. The contest was decided by the emperor Rudolph II in favor of Austria, the precedence of which has not since been called in question. Other dukedoms claimed the privilege of being so called, but it was invariably denied by the emperor.

ARCHEGONIUM, n. *ȧr′kē-gō′nĭ-ŭm* [Gr. *archē*, beginning; *gonē*, seed, generation]: the female organ of sexual reproduction in mosses, ferns, etc.

ARCHEGOSAURUS, n. *ȧr′kē-gō-saw′rŭs* [Gr. *archēgos*, founder, or *archē*, beginning; *saurus*, a lizard]: a remarkable fossil Batrachian, but so named by Goldfuss, as constituting the real beginning of reptilian life, which had previously

been considered as not extending below the Permian series of rocks.

From the engraving, it will be seen that the head of the

Archegosaurus:
a, section of a tooth; *b*, scales.

A. is protected by a firm dermal skeleton, composed of numerous plates, while the internal primary cartilage seems to have continued unossified. The skull is flattened and triangular, with rounded angles, the front one being somewhat lengthened. The teeth are simple cones, having a labyrinthic structure similar to that of the recent *Lepidosteus*. The vertebral column remains in an embryonic condition; the arches and peripheral elements of the vertebræ are ossified; but the *chorda dorsalis*, which is persistent, is unprotected below. The ribs are short and almost straight, round and slender in the middle, expanded and flattened at the ends. The two pairs of limbs are nearly equal in size, and in structure very much resemble those of the *Proteus*. They have each four long, slender digits, which obviously supported a longish, narrow-pointed paddle, adapted for swimming. Externally, the body was protected by a covering of oblong quadrangular scales, which have been preserved in some specimens.

Four species have been described.

The history of the A. is shortly this: Its remains, found in the Bavarian coal-measures, had been described as those of a fish under the name of *Pygopterus Lucius* (Agassiz). In 1844, H. von Meyer first described it under the name of *Apateon pedestris*. This specimen was found in the coal measures of Münster-Appel, in Rhenish Bavaria, and was supposed by Meyer to be related to the salamanders, and yet not without considerable doubt: for he says: 'Its head might be that of a fish, as well as that of a lizard, or of a batrachian.' In 1847, Goldfuss figured and described three distinct species discovered in large concretionary nodules of clay-ironstone, from the coal-field of Saarbrück, giving to them the generic name of A. He considered them to be a transition state between the fish-like batrachia and the lizards and crocodiles. Professor Owen has subsequently described this fossil; he makes it a remarkable connecting link between the reptile and the fish, and on these grounds: It is related to the salamandroid-ganoid fishes by the conformity of pattern in the plates of the external cranial skeleton, and by the persistence of the *chorda dorsalis*, as in

the sturgeon, while it is allied to the reptiles by the persistence of the *chorda dorsalis*, and the branchial arches, and by the absence of the occipital condyle, or condyles, as in *Lepidosiren*, and by the presence of labyrinthic teeth, as in *Labyrinthodon*, which, however, also ally it to the ganoid *Lepidosteus*. There is thus in the A. a blending together of the characteristics of reptile and fish in one animal. It occupies a position between, and equally related to, the salamandroid-ganoid fishes on the one hand, and the labyrinthodont reptiles on the other, while the latter lead through the *Lepidosiren* to the perennibranchiate batrachia

ARCHELAUS, *ȧr'kē-lā'ŭs:* one of the Heraclidæ, who when driven by his brothers from his native land, fled to Macedon, where he became the founder of a powerful family, of which Alexander the Great was said to be a descendant.

ARCHELAUS: natural son of the Macedonian king, Perdiccas II., came to the throne (after he had murdered the rightful heir) in B.C. 413. His reign was far better than its commencement, as he introduced several salutary measures, and was a generous patron of art and literature. Euripides and Zeuxis frequented his court; and the palace of the monarch was splendidly adorned by the paintings of the latter. It is said that Socrates refused an invitation to proceed thither, having no great respect for the character of A., which was stained with odious vices. He is believed to have been murdered by Craterus, one of his favorites; but the story of his death is told differently.

ARCHELAUS: a general under Mithridates the Great, was sent into Greece with a large fleet and an army of 120,000 men to oppose the Romans B.C. 87. Sulla was sent against him, and besieged him in Piræus, whence A. moved to Bœotia, and here collected all his forces. A battle took place at Chæroneia, when victory declared for the Romans. A. now retreated to Chalcis, where he waited until Mithridates had despatched another army of 80,000 men into Greece. The second fight took place at Orchomenos, in Bœotia, and after two days' contest the whole host led by A. was totally routed by Sulla. A., after hiding for three days in a morass, escaped to Chalcis. After a treaty of peace had been effected between Sulla and Mithridates, A. fell under the displeasure of his monarch, being unjustly suspected of treason, and fearing for his life, as also perhaps disgusted at the return he had received for his many services, he went over to the Romans at the outbreak of the second war, B.C. 81. After this time, he appears no more in history.

ARCHELAUS: son of the former, married Berenice, daughter of King Ptolemæus Auletes (B.C. 56), and ruled over Egypt for the short space of six months during the banishment of Ptolemæus. The usurper lost his life in a battle against Aulus Gabinius, proconsul of Syria. His grandson, also named A., obtained from Marcus Antonius the prov. of Cappadocia, and retained it during the reign of Augustus. Tiberius accused him of political innovations,

and condemned him to death; but, as he was old and fatuous, his life was spared. He died soon after his trial, at Rome, A.D. 17.

ARCHELAUS: son of Herod, the tyrant of Judæa, succeeded his father in A.D. 1, and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, A. went to Rome, where his authority was confirmed by Augustus, who made him ethnarch of Judæa, Samaria, and Idumæa. After a reign of nine years, he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienna, in Gaul, where he died. His territories were added to the Roman province of Syria.

ARCHENCEPHALA, n. plu. *âr'kĕn-sĕf'ă-lă* [Gr. *archo*, I rule, I reign over; *engkephălē*, the brain]: Owen's fourth and highest group of Mammalia, comprising *Man* alone.

ARCHENHOLZ, *âr'kėn-holts*, JOHANN WILHELM, Baron von: 1745, Sept. 3—1812, Feb. 28: a German author. After service in the army, he gained his discharge at the close of the Seven Years' War, and passed several years in travel, visiting almost all the principal cities of Europe, and supporting himself by authorship, and, as it was generally reported, also by gambling. He wrote a *History of the Seven Years' War* (2 vols., Berlin, 1793), which when compared with the generally dry style of his German contemporaries deserves praise on account of its narrative interest. He also wrote *England and Italy* (2d ed., Leip. 1787), *Annals of British History* (1789-98), and biographies of Queen Elizabeth of England and Gustavus Vasa of Sweden.

ARCHEOLOGY, etc.: see ARCHÆOLOGY.

ARCHER, *ârch'ėr*, BELLE, actress: b. Easton, Pa., 1860; d. 1890. Her maiden name was Arabella S. Mingle; married Herbert Archer, 1880, and was divorced from him, 1889. She made her début in Washington, D. C., with Wm. Florence in *The Mighty Dollar*, and later played leading parts in *Pinafore*, *Hazel Kirke*, *Lord Chumley* (1888), and Tennyson's *Foresters*. For a time she was leading woman with Sol Smith Russell.

ARCHER, BRANCH T., Texan revolutionist: b. Virginia, 1790; d. Texas, 1856, Sept. 22. He studied medicine in Philadelphia, practiced many years in Virginia, and was repeatedly a member of the legislature. In 1831 he removed to Texas, and was one of the leaders in preparing for the revolution determined upon far in advance of the actual crisis. On 1835, Nov. 3, he presided over the celebrated 'consultation' of the American settlers concerning independence, and immediately after was one of three commissioners—the others being Stephen Austin and N. H. Wharton—to solicit aid from the United States. The next year he became speaker of the House in the first Texan Congress; and he was secretary of war for Texas 1839-42, when bodily infirmity compelled him to retire from public life.

ARCHER, Frederic, organist and musical director: b. Oxford, England, 1838; d. Pittsburg, Pa., 1901. Educated at Oxford, London, and Leipsic, and held important positions as organist in Oxford, London, and Glasgow, 1852-79. Organist Plymouth Church, Brooklyn, N. Y., 1880-85; conductor Boston Oratorio Society, 1887; founded Pittsburg Symphony Orchestra, 1896; organist Church of the Ascension, Pittsburg, 1899-1901. He gave recitals and lectured on musical subjects throughout the United States and Canada. Founded and edited *The Keynote* (1885).

ARCHER, John, physician: b. Harford County, Md., 1741, June 6; d. there, 1810. Graduated at Princeton, 1760, and in 1768 received from the Philadelphia Medical College the first medical diploma issued in America. He raised and commanded a military company during the Revolution, served several years in State Legislature, was a presidential elector in 1801, and member of Congress 1801-7. He made several discoveries in medicine which have been adopted by the profession.

ARCHER, Thomas, an English novelist and essayist. His works deal with the conditions of the working classes and with social evils. Among the best known are: *A Fool's Paradise* (1870); *Profitable Plants* (1874).

ARCHER, William, an English author and critic: b. Perth, Scotland, 1856, Sept. 23. Educated at Edinburgh Univ.; became barrister, Middle Temple, 1883. Went to London 1878, became dramatic critic of the *Figaro*, 1879-81, and London *World* since 1884. In 1899 he visited the United States to study American theatres. He has edited and translated Ibsen's *Prose Dramas* (5 vols. 1890-1); and with his brother translated Ibsen's *Peer Gynt*. He has written *Life of Macready* (1890); *English Dramatists of To-day* (1882); *The Theatrical World* (5 vols. 1893-97); *Study and Stage* (1899); *America To-day* (1900); *Poets of the Younger Generation* (1901); *Masks or Faces; a Study in the Psychology of Acting; Real Conversations* (1904). Since 1893 he has published a year-book of dramatic criticisms comprising the greater part of his contributions to the *World*, and most generally entitled *The Theatrical World*. He gained a wide reputation for his translations of Ibsen's dramas and his attempts to make them popular with the play-going public. His translation of *The Doll's House* was rendered on the stage at the Novelty Theatre in London, 1889, June 7. Besides translations of Ibsen he has also translated Kieland's *Tales of Two Countries* (1891) from the Norwegian and a large part of George Brande's *William Shakespeare* (1898) from the Danish.

ARCHER, n. [F. *archer;* OF. *archier*, a bowman, —from mid. L. *ârcārĭus*, an archer: F. *arche*, an arch—from mid. L. *archĭa*, an arch; L. *arcus*, a bow]: one who uses or is skilled in the use of the bow. Archery, n. *ârch'er-ĭ*, the art of using the bow. Archers are soldiers whose

weapons are the bow and arrow. Among the ancients specially eminent in this mode of warfare, we may particularize the Thracians, Cretans, Parthians, and Numidians; among the moderns, the Arabians, Germans, and Saracens. The emperor Frederick II. employed Saracenic archers with great effect in his Lombard campaign; and to them is ascribed the victory at Cortenuova in 1237. The archers belonged to the light troops, and their province was to open the battle. The emperor Leo especially lauded the dexterity of the Arabian archers. In later ages, the bow came to be employed in England, where the archers wore light armor, a short sword, and a quiver with twenty or more arrows. At first, these archers fought in small groups; in later years, in large masses. At the battle of Cressy, they formed in divisions of 4,000 men, 200 in line and 400 deep. The archers decided the fate of the day in several battles—such as Cressy and Poitiers (1356), Agincourt (1415), Crévaut (1423), Verneuil (1424), and Rovernay (1429). The French archers never equalled the English, in spite of the endeavors of Charles VI. and Charles VII. The latter organized in 1448 the *Franc-archers*, to which corps every parish had to contribute one man; but this measure was attended with so little success that the king was induced to take Scottish archers into his pay, to make any head against the English. The French archers wore a coat of buffalo-hide lined with strong linen, and were accompanied by shield bearers. In this manner 2,000 bowmen with their shield-bearers fought under the Count de Foix at the siege of Bayonne in 1451. The archers universally belonged to the *élite* of the troops, and received higher pay than the rest. At one period, the arbalest or crossbow was more in favor than the long-bow. See ARBALEST. Long after the discovery of gunpowder, the bow and arrow were still used; as, for example, at the siege of Capua in 1500; and the siege of Peineburg in 1502. Even in 1572, Queen Elizabeth promised to place at the disposal of Charles IX. 6,000 men, of whom the half were archers. The English archers are the subject of frequent mention by our old writers. Chaucer, in his *Canterbury Tales*, speaks of the archer

> 'Cladde in cote and hode of green,
> A sheafe of peacock arwes brighte and kene,
> Under his belt he bare ful thriftilie.
> Wel coude he dresse his takel yewmanlie,
> His arwes drouped not with fetheres lowe,
> And in his hand he bare a mighty bowe.'

In a Treatise on Martial Discipline, by Ralph Smithe, written in the time of Queen Elizabeth, we have a picture of the English archer two centuries after Chaucer's time: 'Captens and officers should be skillful of that most noble weapon the long-bow; and to see that their soldiers, according to their draught and strength, have good bowes, well nocked, well strynged, everie strynge whippe in their nocke, and in the middes rubbed with wax braser, and

shuting-glove, some spare strynges trymed as aforesaid; every man one shefe of arrows, with a case of leather defensible against the rayne, and in the same four-and-twentie arrowes, whereof eight of them should be lighter than the residue, to gall or astoyne the enemye with the hailshot of light arrowes before they shall come within the danger of their harquebus shot. Let every man have a brigandine or a little coat of plate, a skull or hufkyn, a maule of leade of five foote in lengthe, and a pike, and the same hanging by his girdle with a hook and a dagger.'

Archery as an out-door exercise or pastime has in recent years been much practiced in England and the United States. During the reign of Charles II., archery was patronized by the court, Tothill Fields being the chief scene of exercise. After his reign, archery fell into disuse for about a century. In 1776, a Mr. Waring revived archery in the neighborhood of London; and very shortly there were several toxophilite or archery societies formed. The system survived till 1793, when another period of inactivity supervened, lasting till 1844. In this last named year, archery was revived in Yorkshire, and has since extended. In the modern exercise of archery, there are several varieties of contests between the antagonistic parties; but the usual variety is target-shooting. Bows are made either of one piece of wood, or two or more strips glued together, preferably of yew. A man's bow is about six feet in length, and a woman's some half a foot shorter. A man's bow requires a pull of from 40 to 50 pounds, a woman's about half that amount. The distance shot varies with the kind of contest: a Potomac round consists of 24 arrows at 80 yards, 24 at 70 and 24 at 60. A double Columbia round of 48 arrows at 50 yards, and 48 at 40. A double York round of 144 arrows at 100 yards, 96 at 80 and 48 at 60. A double National round of 96 arrows at 60 yards and 48 at 50, and a double American round of 60 arrows at 60 yards, 60 at 50 and 60 at 40. The arrow's shape and feathering is a matter of personal inclination. The targets are four feet in diameter, made of banded straw with a canvas front painted in five concentric rings, the centre gold, then red, blue, black and white; the value in counting shots being, respectively, 9, 7, 5, 3 and 1. There are in the National meet also competitions for longest flight and annual team competitions of 96 arrows at 60 yards for men and 96 arrows at 50 vards for women.

ARCHER FISH: a name given to certain small East Indian fishes of the Acanthopterygious family of *Squamipennes* or *Chætodontidæ*, which have the faculty of projecting drops of water with sure aim at insects, and thereby causing them to fall into the water, where they are instantly seized as prey. *Toxotes jaculator*, one of these species, is a fish about six or seven inches in length.

ARCHETYPE, n. *âr'kĕ-tīp* [F. *archétype*: L. *archĕtypum*: Gr. *archĕt'upŏn*, an original—from Gr. *archē*, beginning; *tupos*, form]: the original or model from which copies are made; an ideal primitive type; a pattern. ARCHETYPAL, a. *âr'kĕ-tī'păl*, original.

ARCHETYPE, (in Philosophy) a word used by Plato to designate the absolute idea which he supposed to be the true reality. The actual objects of the world about us, which we perceive, were supposed by him to be simply imperfect copies of these absolute ideas. Some of these objects were nearer the fundamental reality than others, for example, a table is evidently more nearly akin to the archetypal table than is a drawing of the same table.

ARCHI-EPISCOPAL, ARCHDIAICONAL, etc.: see under ARCH 3.

ARCHIGRAPHER, n. *âr-kĭg'ra-fĕr* [Gr. *archos*, chief; *graphein*, to write]: a chief secretary.

ARCHIL, n. *âr'kĭl* or ORCHIL [OF. *orcheil; orseillē*—from Sp. *archilla:* origin undetermined]: a coloring substance obtained from various species of lichens. The lichens, collected from rocks near the sea, are cleaned, ground into a powder with water placed in tanks, and ammoniacal liquids—such as purified gas liquor or stale urine—added, when by the combined influence of the ammonia, air, water, and the constituents of the lichens, a violet-colored matter is generated, which appears for a time to dissolve in the water, but finally falls to the bottom of the vat in the condition of a moist powder or paste. The latter is then mixed with some substance like chalk or stucco to give it consistence. The lichens which yield the best A. in largest quantity are *Roccella tinctoria* and *fuciformis*. The former is called the *Archil* plant, and is obtained in large amount from the Canaries and Cape de Verd Islands, and the Levant. Another lichen, *Lecanora tartarea*, is collected from rocks in Sweden, and largely exported. It is sometimes called cudbear (q.v.), or cudbear lichen, and sometimes white Swedish moss. A. is soluble in water and in alcohol, to either of which it imparts a violet color, with much of a crimson hue. It is much employed in the dyeing of silks, where a beautiful lilac color is required; but though a brilliant rich hue is imparted to the silken fabric, the color is not permanent, being easily acted upon by the rays of the sun. Hence the A. is seldom used by itself, and the cloth is first dyed lilac by another coloring matter, and is then passed through an A. dye, which imparts a brilliant lilac hue to the cloth. A. is seldom employed

to dye cotton cloth, but it is often used, with indigo, in the dyeing of woolen cloth, and besides enabling the indigo color to go much further, it imparts its peculiar rich tint to the blue or black cloth or yarn immersed in it; the color, however, so obtained is not so permanent as where the A. is left out. Cudbear (q.v.) and Litmus (q.v.) are analogous to A., and are obtained from the same lichens.

The lichen distinguished by the name of the A. plant or lichen, *Roccella tinctoria*, grows very sparingly on the southern coasts of England, but abundantly on the shores of the Mediterranean and of the neighboring parts of the Atlantic, where it often covers rocks near the sea, so as to form what has been likened to a sort of turf upon them. The Spanish name is *Orchilla*, from which the French *Orseille*, the English A. or Orchil, and (as has been thought) even the botanical name *Roccella*, are derived. It is of a substance between cartilaginous and leathery, roundish, somewhat erect, branching in a dichotomous manner, of a grayish brown color, with powdery warts (*soredia*); the *apothecia* (q.v.) orbicular, flat, horny, almost black, with a scarcely prominent border. That from the Canary Isles is generally regarded as the best. It seldom exceeds the thickness of a pin, and about an inch and a half in length. A less branched and more slender, prostrate, or pendulous variety (*Roccella hypomecha* of Bory de St. Vincent) is common at the Cape of Good Hope and in the island of Mauritius, and appears in commerce with the other, but is inferior. A variety remarkable for its large size, or perhaps a distinct species (*R. flaccida*), is brought from Lima and other parts of the w. coast of South America; it is sometimes as thick as a goose quill, and 6 or 8 inches long, and is of excellent quality. All those, and *Roccella fuciformis*, very generally receive in commerce, and from archil-makers, the name of Orchella weed, the different kinds being distinguished according to the countries from which they are imported. They are also popularly called Dyer's Moss.—*R. fuciformis* now yields perhaps more of the A. or Orchella weed of commerce than *R. tinctoria*. It differs from *R. tinctoria* chiefly in being not rounded, but flat, and in having the *apothecia* very distinctly bordered. It grows in similar situations, and is also a native of Britain, but abundant only in warmer climates, as on the coast of Africa, Madagascar, etc. That from Angola is reckoned the very best.

Among the lichens from which A. is manufactured is the *Parelle d'Auvergne* or *Orseille de terre* (Ground A.) of the French, *Variolaria orcina* or *corallina*, which is gathered for this purpose in mountainous districts of the s. of France and other parts of the s. of Europe, and is also an article of export (with other similar lichens) from Sweden to Holland. But the greater facility with which A. of the finest quality can be procured from the species of *Roccella*, and the increasing abundance of the supply from different quarters, particularly from Angola, tend to diminish the demand for other lichens.

ARCHILOCHUS, *ar-kil'ō-kŭs*, OF PAROS, in Lydia: abt. B.C. 714–676: regarded as the first of the Greek lyric poets,

although the origin of the elegy is claimed for Callinus, a writer whose age seems to have slightly preceded that of A. Glimpses of his life, especially of the calamities that befell him, were frequently given in his writings. His father's name was Telesicles, his mother was a slave called Enipo. At an early age, becoming entangled in political contests, he abandoned his native town, and led a colony of the citizens to Thasos. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians, yet not through cowardice. Subsequently he was banished from Sparta, to which he had gone, some say because he had vindicated his conduct in running away from the fight, others because of the licentiousness of his verses. He is said to have gained the laurel wreath at the Olympic Games by an ode in honor of Hercules, but this is doubtful. Having returned to Paros, he took part in the war which broke out between it and Naxos, in the course of which he lost his life, either in battle or by assassination. The Delphian oracle pronounced a curse upon his slayer. Variety, novelty, and satirical bitterness characterized his lyric poems; so much so, that 'Archilochian bitterness' and 'Parian verse' became by words in ancient times. He scourged his enemies in the most merciless fashion, and always displayed the most malicious skill in selecting for his sarcasm the points on which they were most sensitive. It is said that Lycambes, who had promised his daughter Neobule in marriage to A., having failed to fulfil the promise, was so severely satirized by the poet, that to escape ridicule both father and daughter hanged themselves. Among the ancients, A. was ranked with Homer. They dedicated the statues of both on the same day, and placed the head of A. beside that of Homer on the same bust. It is therefore supposed, and with high probability, that there must have been far more in A. than mere vehemence of satire. Even Plato, who was not likely to err on the side of admiration in such a case, calls him 'the very wise'; and Gorgias, the rhetorician, is reported to have said, when Plato sent forth his dialogues against the Sophists, 'Athens has given birth to a new A.' There must have been strong sense and a keen perception of truth in the man, to have won so universal and permanent a reputation. Still the line of Horace—who was a vigorous imitator of him in many respects—proves that 'rage' was considered 'the special faculty' of A.

'*Archilochum proprio* rabies *armavit iambo.*'
Ars Poetica, line 79.

'Rage hath armed Archilochus with his own iambus.'

The word *iambus* was in use before the time of A., and was employed to denote a species of rude raillery, such as flashed out spontaneously under the inspiring excitement of the Bacchic and other festivals. A. was, however, the first to reduce these irregular and capricious effusions to fixed rules. See IAMBICS. The semi-pentameter, of which he made abundant use, was called after him *Archilochian verse.*

The fragments extant of his poetry have been edited by Bergk in his *Poetæ Lyrici Græcorum* (Leipsic, 1843).

ARCHIMANDRITE, n. *ȧr'kī-măn'drīt* [L. and Gr. *archĭ-mandrī'tēs*—from Gr. *archos*, chief; *mandra*, a fold or enclosure as for cattle, a monastery]: title of the highest order of superiors of monasteries or convents in the Greek Church. See ABBOT. The Russian bishops are chosen from among the archimandrites.

ARCHIMEDEAN, a. *ȧr'kĭ-mē'dē-ăn:* pertaining to *Archĭmēdēs*, a great mathematician of ancient times. ARCHIME'DEAN SCREW, a machine for raising water, consisting of a tube coiled spirally round a revolving axis.

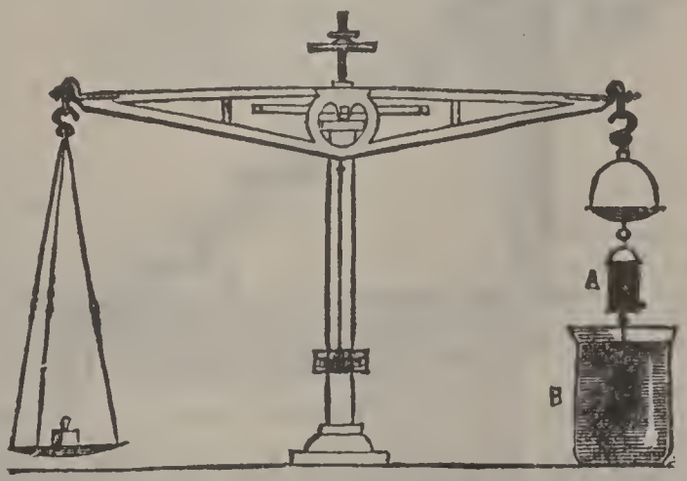
ARCHIMEDES, *ȧr-kĭ-mē'dez:* the most celebrated of ancient mathematicians; B.C. 287—212; b. Syracuse. He is said to have been a kinsman of King Hiero, though he does not seem to have held any public office, but devoted himself entirely to science. In regard to mathematics, we cannot estimate fully the merits of A. without a more exact knowledge of the state of the science as he found it; we know, however, that he enriched it with discoveries of the highest importance, on which modern mathematicians have founded their methods of measuring curved surfaces and solids. Euclid considers only a few curved figures in relation to one another, but without comparing them with rectilineal surfaces and solids. The theorems necessary to this transition are laid down by A. in his treatises 'on the Sphere and Cylinder,' 'on Spheroids and Conoids,' and 'on the Measurement of the Circle.' His demonstration that the area of a segment of a parabola is two thirds of the enclosing parallelogram, is the first real example of the quadrature (q.v.) of a curvilinear space. In his treatise on spirals, he rises to yet higher investigations, which, however, are not very easily understood even by masters of the subject.

A. is the only one of the ancients that contributed anything satisfactory on the theory of mechanics and on hydrostatics. He first established the truth that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. See ARCHIMEDES, THE PRINCIPLE OF. It was by this law that he determined how much alloy the goldsmith whom Hiero had commissioned to make a crown of pure gold had fraudulently mixed with the metal. The solution of the problem suggested itself to him as he was entering the bath, and he is reported to have been so overjoyed as to hasten home without waiting to dress, exclaiming: 'I have found it! I have found it!' (*Eureka! Eureka!*) Practical mechanism seems to have been an equally new science in the days of A.; for his boast, that if he had a fulcrum or stand-point he could move the world, betrays the enthusiasm with which the extraordinary effects of his newly invented machines inspired him. Among the numerous inventions ascribed to A. is that of the endless screw, and the *cochlea* or water-screw (see ARCHIMEDES SCREW), in which the water is made in a manner to ascend by its own gravity. During the siege of

ARCHIMEDES.

Syracuse by the Romans, he exerted all his ingenuity in the defense of the city. Polybius, Livy, and Plutarch speak with astonishment of the machines with which he opposed the attacks of the enemy. But while giving detailed accounts of his other contrivances, they say nothing of his having set fire to the ships by means of mirrors, a story which is not very probable in itself, and rests on later narratives. When the Romans took the city by surprise, A., according to tradition, was sitting in the public square lost in thought, with all sorts of geometrical figures before him drawn in the sand. As a Roman soldier rushed upon him, he called out to him not to spoil the circle. But the rude warrior cut him down. According to his own direction, a cylinder enclosing a sphere was engraved upon his tombstone, in commemoration of his discovery of the relation between these solids—a discovery on which he set particular value. When Cicero was in Sicily as quæstor (75 B.C.), he found the tomb hid among briers. A very complete edition of the works of Archimedes issued from the 'Clarendon Press,' at Oxford, in 1792. Other editions appeared in 1881, and 1897. There is a French translation by Peyrard (Paris, 1808), a German by Nizze (Strals, 1824). The *Arenarius* was translated into English by G. Anderson (Lond. 1784). Its object is to prove that it is possible to assign a number greater than that of the grains of sand that would fill the sphere of the fixed stars, the diameter of which A. assumes at a certain number of stadia. The difficulty lay in expressing such a vast number by means of the clumsy notation of Greek arithmetic.

ARCHIMEDES, The Principle of: one of the most important in the science of Hydrostatics, so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body when immersed in



a fluid loses exactly as much of its weight as is equal to the weight of the fluid it displaces; or: A fluid sustains as much of the weight of a body immersed in it as is equal to the weight of the fluid displaced by it. It is proved experimentally in the following way. A delicate balance is so arranged that two brass cylinders, A and B, may be suspended from one of the scale-pans, the one under the other.

The lower cylinder, B, is solid, or closed all round, and fits accurately into the upper cylinder, A, which is hollow. When the two cylinders are placed under one scale, pan-weights are placed upon the other until perfect equilibrium is obtained. The cylinder B is now immersed in water, and in consequence of the buoyant tendency of the water exerted upon it the equilibrium is destroyed; but it may be completely restored by filling the hollow cylinder A with water. The amount of weight which B has lost by being placed in the water is thus found to be exactly the same as the weight of a quantity of water equal to its own bulk, or, which is the same thing, to the quantity of water displaced by it. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves they swim on the surface, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own bulk, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same weight as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. The pretty scientific toy called the Cartesian Diver is intended to illustrate this. Although the principle of Archimedes is generally established with reference to water, its application extends equally to bodies immersed in air or any other fluid.

ARCHIMEDES SCREW (called also the *spiral pump*): machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Fig. 1 represents it in its simplest form.

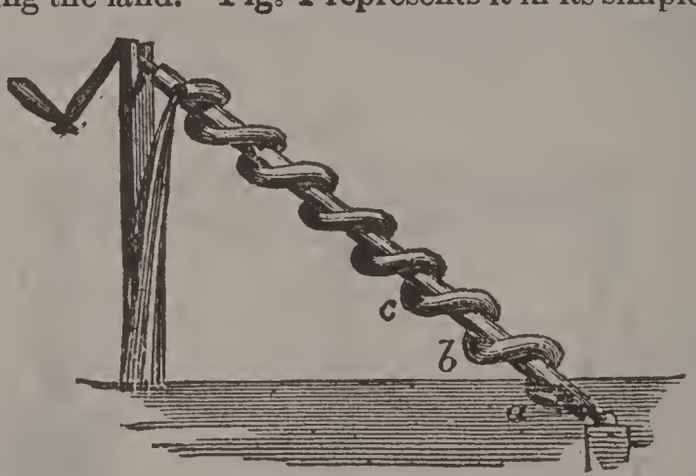


Fig. 1.

This consists of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. In the position represented in the figure, the lowest bend (*a*) of the tube will be filled with water, and if now

the handle be made to turn in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend, *b*. The first bend (*a*) has meanwhile received a second charge, which, after a second revolution, flows up into the second bend (*b*), and takes the place of the first charge which has now moved up to the third bend, *c*. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution, the lowest bend will be charged, and the highest discharged. It will be seen from the figure that there is room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines, the cylinder itself is hollowed out into a double or triple threaded screw, and inclosed in a water-tight case, which turns round with it, the space between the threads supplying the place of such tubes as are seen in Fig. 1. Fig. 2 represents a double-threaded A. S. of this description, with the case removed in front It is sometimes found convenient to fix the exterior envelope, and to

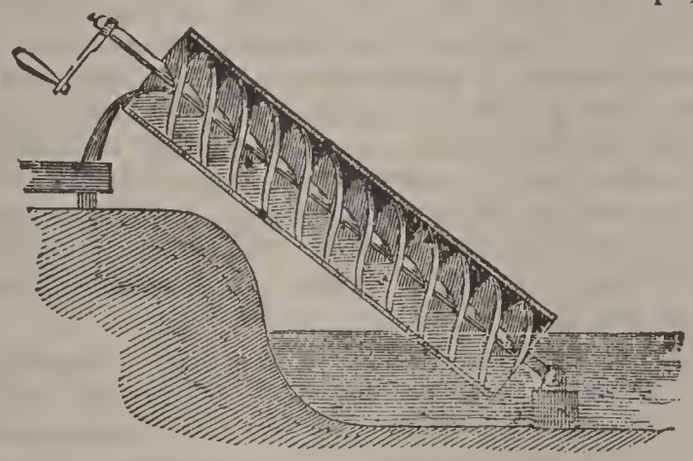


Fig. 2.

make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact. This modification of the A. S. receives the name of water-screw, and frequently of Dutch screw, from its being extensively used in Holland for draining low grounds.

ARCHIPELAGO, n. *ȧr'kĭ-pĕl'ă-gō* [Gr. *archos*, chief; *pelăgos*, sea: It. *arcipelago*]: the Ægean Sea; any sea closely interspersed with islands—now frequently applied simply to a cluster of islands. ARCHIPELAGIC, a. *ȧr'kĭ-pĕl-ăj'ĭk*, pertaining to an archipelago.

ARCHIPEL'AGO: a term applied originally to that gulf of the Mediterranean which separates Greece from Asia; but now extended to any sea, like it, thickly interspersed with islands, or rather to the group of islands themselves. The

islands in the Greek Archipelago or Ægean Sea consist of two groups, called Cyclades and Sporades, the first from their being massed after the manner of a circle, the second from their being scattered in something of a line. The former lie to the e. of Southern Greece, while the latter skirt the w. of Asia Minor.

Of the Cyclades the principal islands are Lyra, Kythnos, Thera, Tenos, Andros, Naxos, Melos, and many more of inferior size. They all belong to *Greece* (q.v.). The chief islands of the Sporades are Scarpanto, Rhodes, Cos, Patmos, Nicaria, Samos, Scio, Metelin, Lemnos, Imbros, Samothraki, Thasos, and many more of inferior size. These all belong to Turkey, and constitute a separate vilayet of the empire. For the more considerable islands of both groups, and for the other Archipelagoes, loosely so called, see their respective titles.

It is noticeable that the islands of the globe rarely stand alone. With very few exceptions, they may all be classified into clusters. In most clusters, again, there is generally more or less of similitude between the different members of each—similitude sometimes of one kind, and sometimes of another. Perhaps the similitude most obvious even on the face of an ordinary map is that, really like the links of a chain, the members of a cluster have their lengths, as distinguished from their breadths, in one and the same direction. In the West Indies, for instance, look at the Bahamas, and look also at the Antilles, Greater and Lesser. In the East Indies, again, the same thing is seen in carrying the eye from the n. end of the Philippines to the n. end of Sumatra, or even on the Andamans. Lastly, on the opposite coasts of the Upper Pacific, observe the American side upwards from the s. end of Vancouver's Island to Mount St. Elias, and the Asiatic side downwards from the upper extremity of Kamtchatka—which is almost an island—through the Kuriles, to the lower extremity of Japan.

ARCHITECT, n. *ârʹkĭ-tĕkt* [F. *architecte*—from L. *architecʹtus*—from Gr. *architectōn*, a chief builder—from Gr. *archos*, chief; *tektōn*, a builder]: one who designs and plans buildings; a former or maker. ARCHITECTIVE, a. *ârʹkĭ-tĕk-tĭv*, used in, or proper for, building. ARʹCHITECTONʹIC, a. *-tĕk-tŏnʹĭk*, that has the power or skill to build. ARʹCHITECTONʹICS, n. *-ĭks*, the science of architecture. ARCHITECTURAL, a. *ârʹkĭ-tĕkʹtū-răl*, pertaining to the art of designing buildings. ARCHITECTURE, n. *ârʹkĭ-tĕkʹtūr*, the art of planning and constructing houses or ships; the appearance of them when built or framed.

ARCHITECTURAL PAINTING: painting having for its subjects the exteriors or interiors of remarkable buildings; churches, castles, streets in cities, etc. It is mentioned by Vitruvius, but is comparatively a modern art. Benozzo Gozzoli, Ghirlandajo, and the Venetian school, cultivated this department of art in the middle ages; and Pinturicchio, by order of Pope Innocent VIII., painted a series of views of cities in the style of the Flemish school, which, under the brothers Van Eyck, had distinguished itself by careful

treatment of architectural backgrounds, etc. For a long time A. P. was regarded only as accessory to other styles of art; but at the close of the 13th c., P. Neefs, in his views of the interiors of Gothic churches, gave to this branch of the fine arts an independent form; and Steenwyck the younger, in the following century, extended its application in his views of the interiors of prisons, of which his picture of *Peter Liberated from Prison* is an example. The art was still further extended and cultivated by Van der Heijden, Blick, Van Deelen, E. de Ville, Johann Gehring, and others, who painted views of church interiors in the Italian style, palaces and chambers. The interior view of the Church of Amsterdam, painted by Ruisdael, deserves especial notice. In the 18th c. the Venetian Canale and his nephew Bellotto (generally known by the name of Canaletto) painted many views of cities, but especially of the canals and buildings of Venice. Collections of their numerous works are found at Dresden, Woburn Abbey, etc.

In recent times, A. P. has been very successfully cultivated in Germany, France, England, Holland, and Belgium. Schinkel is celebrated for his fine union of classical taste with richness of decorative invention. His two most striking works are St. Peter's, and the Duomo at Milan; Paul Gropius has shown great talent in his Cathedral at Rheims, built in honor of Joan of Arc. His dioramas are well known; and Domenico Quaglio (d. 1837), throughout his innumerable compositions, has exhibited an exquisite appreciation of perspective and of the poetical arrangement of details. Among modern architectural painters may be mentioned—in England—Prout (views of Italy, Germany, etc.), Roberts (whose genius has sought for its materials in Spain and the East, and who paints the architecture of foreign lands with rare truthfulness and vigor), Mackenzie, Goodall, Williams, and the water-color painters Haghe, Chase, Howse, and others; in France —Granet (d. 1849), the most celebrated art painter of the new French school; the water-color painters Ouvrié, Garney, Rochebrune, Villeret, and Puvis de Chavannes; in Italy—Migliara and Nehrlich (a German who has been styled 'the modern Canaletto'); in Germany—Von Bayer, Hasenpflug of Halberstadt (who paints beautifully old cloister-abbeys under winter effects), Ainmuller, Vermeersch, Pulian of Düsseldorf (who displays great skill in the representation of old streets and time-worn churches), Conrad, Gärtner, Groeb, Helfft, Dietrich, etc.; in Holland and Belgium—Waldorp, Carsen, Boosborn, Von Haanen, Ten Kate, Springer, and Bossuet. In the U. S. architectural painting first assumed importance in 1876, when John La Farge began the decorations of Trinity Church in Boston, and William Morris Hunt, the small paintings in the Albany Capitol. Later important examples of architectural painting are the works of Abbey and Sargent in the Boston Public Library, numerous paintings by La Farge and others in private residences and

hotels, and the beautiful decorations of the Congressional Library Building by Elihu Vedder, Edward Simmons, E. H. Blashfield, and many other American artists.

AR'CHITECTURE: art of planning and constructing. A. is usually divided into Civil, Military, and Naval. In the present article the first is considered: for the other two see FORTIFICATION: SHIP-BUILDING. Civil A., in the widest sense, may be regarded either from an artistic, a scientific, or a utilitarian point of view. In the first case, as a means of giving external form and sensible expression to mental conceptions or ideas, it is a branch of æsthetics, or of the fine arts properly so called (see ART), and takes rank with sculpture and painting; in the second case, it consists in a knowledge of certain laws of physical nature, and a consequent power of calling them into play, or counteracting their operation, and is consequently a branch of that wider department of science to which the name of *Mechanics* (q.v.) is given; whereas in the last it becomes a practical art, which has for its object the application of the principles, both artistic and scientific, which A. embraces, to the increase of the physical comfort and well-being of mankind, and to the pleasing of the senses. But though it admits of being thus analyzed or separated in thought, it must not be imagined that A. can exhibit in practice any one of these principles to the exclusion of the others. The abstract conception of all-pervading deity, as embodied in the Greek temple—the religious aspirations after a personal God, as shadowed forth in the Gothic cathedral—can be realized only in accordance with the principles of mechanics, and the most rigorous adaptation of means to ends; whereas, in an opposite direction, the kraal of the Hottentot, or the hut of the Indian in the American wilderness, if properly constructed for their respective purposes, will be found to have obeyed such æsthetical principles as they may have come in contact with. Nature is not self-contradictory; and art and science, beauty and utility, when rightly understood, are never in conflict. A celebrated German writer and thinker (F. Schlegel) has described A. as 'frozen music:' and the comparison is just; for music, though apparently the freest and most lawless, is in reality the most rigorously scientific of the arts. But though a strict adherence to all the principles of A. be indispensable to every genuine architectural structure, whatever be its object, it does not follow that equal prominence must be given to each of these principles on every occasion. If a building has for its primary object the expression and commemoration of such feelings as grief, gratitude, devotion, or the like, this object manifestly will be best attained by subordinating the scientific and utilitarian to the æsthetic principles of A.; and the reverse will be the case where mere convenience, and also, though in a lesser degree, where convenience, in combination with beauty or magnificence, is sought. It is in a great measure by the prominence

which they have given to one or other of these principles, that different nations have displayed their diversities of character in their A. The speculative and poetical character of the Greeks was exhibited in their temple, while their preference of the state to the individual appeared in the fact that these structures were designed for the worship of the protecting divinity of the city by the citizen of the state, not for the worship of a personal God by the individual man. Among the Romans, terrestrial power and material aggrandizement were the exclusive national aspirations, and consequently their A. had their own honor and glory primarily in view. The basilicas, amphitheatres, and triumphal arches of the Romans were their own; but the temples which they raised in honor of their gods were little else than imperfect copies from the Greek, with scarcely any assignable national characteristics. Then in mediæval times, though, on the revival of spiritual tendencies, æsthetic principles again became prominent, they exhibit themselves under totally different forms; and the distinctions between heathen and Christian thought could scarcely be more distinctly stated in words than they are exhibited to the eye in the difference between a Greek temple and a Gothic cathedral. But apart from the mental characteristics and tendencies of a people, many other circumstances modify their A. Of these, one of the most important is climate. Arrangements for the permanent and commodious residence of a family within doors could not be expected to attain much perfection among a race like the Greeks, whose life was spent in the open air; and the climate of Holland, as well as the genius of the people and the character of their occupations, has had much to do with the fact that Dutch A. has rarely risen above a town-house. Following thus the peculiarities of national character and circumstances, it is obvious that the more widely these differ in any two nations, the more dissimilar will be the styles of A. which they produce respectively. Moreover, it is apparent that the higher the stage of national development, the more marked will be the character which the A. of the people will assume. Further, in the fact that all genuine A. is the expression of the ruling national ideas and forms of thought of some one particular people, we perceive the reason why a building compounded of several styles should be characterless and unpleasing; and why this should be more and more the case, the more characteristic the styles compounded, and the greater the equality preserved among them. The Doric pillar in itself, still more, perhaps, the Roman adaptation of it, is the simplest and most rudimentary of all pillars; and what we are in the habit of calling Saxon is the simplest and most rudimentary of all the styles of Gothic A.; and hence the introduction of a few Tuscan pillars considerably modified into a Saxon or Romanic church does not awaken feelings of very decided repugnance, whereas an attempt to combine equally the beauties

of the Parthenon and of Cologne Cathedral in the same building would be revolting. For the origin and development of the different styles of A., see EGYPTIAN A.: INDIAN A.: GREEK A.: GOTHIC A.: ARABIAN A.: also ARCH: PILLAR: ARCHITRAVE: etc. The attempt may here be made to trace the earlier stages throughout which A. passed in the historical nations, before it reached the point at which it afforded the means of expressing the feelings or supplying the wants of mankind.

1. The earliest stage of monumental A. in every part of the world seems to have been that in which it supplied to the existing generation the means of setting a mark on the face of the earth, of a nature so ineffaceable it should continue visible to future generations. No attempt was yet made to tell a tale either by the form of the monument, or by any figure or inscription engraven on it. Apart from the tradition intended to accompany it, it was speechless—confessedly unintelligible. But it is easy to see how powerful would be the effect of such an erection in preserving that tradition from oblivion, and fixing it down to the particular locality; for so long as a conspicuous object existed, obviously the work of human hands, the cause of its existence would be a subject of curiosity, which could be gratified only by inquiries that must lead to a recital of the events intended to be commemorated. To this primary class of monuments belong those tumuli or barrows, and conical heaps of stones called cairns, carns, or kearns, which, when they occur in Britain, are perhaps rightly ascribed to the Celtic portion of the early inhabitants, but which there is much reason to believe have been erected by every race at a certain stage of their progress. The barrow, it is true, is not wholly destitute of architectural arrangements. Occasionally it contains a passage or narrow gallery leading to a square enclosure or small chamber, in which the remains of bones, and of rude urns, drinking-cups, and other articles, sometimes of Roman or Brito Roman manufacture, are found. The barrows are always, however, of the rudest and most inartificial construction, and in considering them we are only on the threshold of architectural science.

2. The earliest class of erections to which this title can with any propriety be given are those commonly spoken of as Druidical temples. These consist generally of separate stones, often of enormous size, raised on their ends, sometimes in a circle, and at other times so as to enclose an oblong space, which in some cases is roofed in by horizontal slabs. These roofing-stones are frequently of such prodigious weight as to give rise to many conjectures regarding the mechanical means by which, and the mechanical knowledge of those by whom, they were placed in the positions in which we see them. These strange, and, to us, almost wholly unintelligible remains of antiquity, when of great extent, assume an air of savage and gloomy majesty. Of this the most conspic-

uous instance anywhere to be found is that of Stonehenge (q.v.), in Salisbury Plain in Wiltshire. Wherever a Celtic population existed, these monuments are to be found. Druidical monuments are more common in France than in England; and in France, as might be expected, they exist in the greatest numbers and variety in Brittany (q.v.), though none of them approach the magnitude, or, in some respects, the workmanship of Stonehenge. The Celtic monument of Brittany are of different classes, and have received different names—that which is most architectural in character being the dolmen, or cromlech, as it is called in England. The cromlech consists generally of two rows of perpendicular stones, arranged so as to fit somewhat closely to each other, and covered with horizontal roofing-slabs, thus forming a chamber, generally of such height as to allow a man to walk through it upright. But the largest and most perfect specimen of the dolmen is to be seen, not in Brittany, but in the neighborhood of Saumur on the Loire. It measures more than 80 ft. in length. To the same early stage in the science, though probably to a much earlier period in point of time, are to be referred those cyclopean walls and fortifications which at Tiryns and Mycenæ in Argolis excited the wonder of the later Greeks; the Etruscan walls at Fiesole; and the similar structures found both in Central and S. America.

3. The next stage in advance of that primeval and prehistoric one of which the traces are thus so widely spread, is that at which the science seems to have culminated in all but the classical nations of antiquity, and those races which have had the benefit of their genus and invention. We have here an accurate measurement of parts, and a corresponding division of the building. The pillar also makes its appearance, though it is by no means used with the same freedom, nor does it exhibit the same variety of form to which it attained in Greek A. This stage was attained by the inhabitants of Central and S. Amer. before its discovery by Europeans; and in Mexico, even by the Toltecs, an earlier race, which had given way before the Mexicans of the days of Cortez. Peruvian A. exhibits neither columns nor arches; but the remains of the palace at Mitla possessed a portico with plain cylindrical columns; and the walls were covered with rude sculpture. In the cloisters of a building at Palenque, a species of inartificial triangular arch, formed by courses of stones projecting over each other, was found. It is very instructive as showing the natural, and, so to speak, necessary character of certain architectural forms at certain stages of national development, to find that the pyramid, which is little more than a regularly constructed cairn, is found even more frequently in Mexico than in Egypt; and whether or not it was the primary form of the pagoda of India, it certainly formed the basis both of Mexican and Egyptian A. The keen discussions as to the priority of date of Indian and Egyptian A. lose much of their importance

when a race is found acting in all probability independently of both, starting from the same primary form as the one and in the discovery of the pillar and the arch making two of the most important of the further steps in advance to which they respectively lay claim. Keeping these facts in view, it seems, moreover, that something more is required to prove a historical connection between Doric and Egyptian A. than the circumstance that the columns which they respectively employ possess a base, a shaft, and a capital, or that both are used to support an entablature. Even the long unbroken horizontal lines which seem to indicate an affinity between the architectural styles of Egypt and of Greece, and which distinguish them both so sharply from the Christian A. of mediæval Europe, may be the result rather of a similarity of circumstances than of an identity of origin. Though these styles agree in having columns, and though the columns support horizontal entablatures in each they disagree in the forms of the columns, in the character of the entablature, and, indeed, in almost every other particular. While Greek pillars taper towards the top, and the walls are vertical, in Egyptian buildings the reverse is the case, the pillars being vertical and the walls sloped. When the effect of a whole Greek building, surrounded by a colonnade, and of an Egyptian building is considered, a certain similarity appears—the base in each case being wider than the upper part; but the result is produced in the one case by sloping the pillars, and in the other by sloping the walls, the external edges of which form a slightly acute angle with the base of the building. The great distinction, however, between the A. of Egypt and Greece consists in the stages which they respectively reached. The A. of Egypt retained throughout a character of gloomy strength, and never attained the lightness, freedom, or variety of that of Greece. In one case, the traditionary forms continued throughout to dominate and subdue the free spirit of art; in the latter, art triumphed over tradition, and owned no laws but its own. It is at this point that the distinction appears between the stage of A. of which Egyptian may be considered the type, and that ultimate stage reached by the Greeks in one direction and by the various Germanic nations in another. See Arabian A.: Byzantine Art: Gothic A. For the profession of architecture, see Building.

ARCHITECTURE, American. The first real development of American architecture began with the construction of the national buildings in Washington; after the war of 1812, the Capitol, which had been burned by the British, was rebuilt in its original form, a low central dome over the two wings. The White House was also completed at about the same time. As indicated in the plan of the latter, a taste for Grecian architecture prevailed during the early part of the 19th century. It is seen in the city halls, court houses, State capitols and other public buildings erected during the time; of these may be mentioned the Nashville State House, the old custom house in New

THE "FLATIRON" BUILDING, NEW YORK.

York, and the original buildings of the University of Virginia. During this time the private houses were almost all in the style known as 'Old Colonial Architecture,' which was an adaptation with few modifications of the real colonial architecture of an earlier period. The tendency toward the Greek, however, is indicated in some cases by the use of a portico with four or six pillars.

The Gothic revival was seen in the U. S. at an early date in the building of Trinity Church New York by Richard Upjohn (1839–1846), carefully studied from the English Perpendicular styles, and other churches. No form of pointed style, however, was commonly used for any buildings except churches. The public buildings of this time, which were unimportant, still followed the pseudo-Greek style; while Upjohn designed some country residences in the style of Italian villas, and other designers adopted Elizabethan or semi-classic styles.

In 1855, Richard Morris Hunt returned to New York from Paris, designed several buildings, and established an atelier on the Paris plan, where many architects were students. Experiments in materials and design were tried to some extent at this time, especially in the building of several business buildings and of New York churches, but on the whole the public buildings of the period of 1850 to 1860 were generally without individuality or any remarkable architectural design.

After the war, there came a period of great activity, especially in the construction of business blocks and private residences in the cities, and of country houses in the smaller towns. The result, without any established style of architecture, was a mingling of styles, and clashing of tastes which resulted in ugliness, lack of proportion, and often absolute grotesqueness. The Gothic revival led to the erection of some important buildings, such as the Boston Museum of Fine Arts, and the New York Academy of Design; but it also led to a taste for pointed windows and the accompanying ornamentation which was used with exaggerated and wholly inartistic effect. The same incongruity effected most of the public buildings, of the time, especially many of the government buildings erected in various cities.

With 1875 began a period of more careful designing. Henry Richardson began his work at about that time, and a few years later adopted the Romanesque style which always characterized his work. About the same time many churches, college buildings, and some business buildings were erected which showed a careful working out of a modified Gothic style. The development of an artistic treatment of the American frame house for country and suburban residences also marked this period.

Since 1885, there has been a great increase in the number of important buildings, both public and private. The public buildings have, on the whole, been marked by careful designing and suitable dignity; in some of the larger cities the establishment of municipal art commissions has

resulted in marked improvement in the artistic qualities of municipal architecture. The municipal and U. S. buildings of many of the Western cities belong to this period, and also the Congressional Library at Washington which has attracted national attention. In spite of this advance, there has been no typically national style of architecture evolved; individual architects have dealt successfully with individual problems, but progress has gone no further than this. In the business world the adoption of the steel-cage form of construction has introduced so many new problems, that the architects have not yet had time to work out a satisfactory design for the artistic as well as practically useful construction of this type of building.

ARCHITRAVE, n. *âr'kĭ-trāv* [It. *architrave*—from Gr. *archos*, chief: It. *trave*, a beam of timber—from L. *trabem*, a beam]: in *arch.*, that part of the entablature which rests immediately upon the capitals; a molding above a door or a window, and the like.

ARCHIVES, n. plu. *âr'kīvz* [F. *archives*—from L. *archivum*, a depository for important documents—from Gr. *archeion*, the public hall]: the place where public documents are kept; a collection of records or documents. See RECORDS. ARCHIVAL, a. *âr-kī'văl*, of or containing archives. ARCHIVIST, n. *âr-kī'vĭst*, a keeper of records.—SYN. of 'archives': records; chronicles; registers.

ARCHIVOLT, n. *âr'chĭ-vōlt* [It. *archivolto*—from *architrave*, and *volto*, a vault, an arched place]: in *arch.*, a band or group of moldings and ornaments on the face of a classical arch; a mass of moldings on the faces and soffits of mediæval arches.

ARCHON, n. *âr'kŏn* [Gr. a ruler, a prince]: the highest magistrate in ancient Athens. The government was originally monarchial; but on the death of Codrus (q.v.), the Athenians, according to the traditionary account, resolved that no one should succeed him with the title of king (*basileus*), and therefore appointed his son Medon with the title A. (ruler). The office was at first for life, and confined to the family of Medon; but B.C. 752, the time of office was limited to ten years; and in 714, the exclusive claims of Medon's family to the office of A. were abrogated, and it was thrown open to all persons of noble birth; afterwards to all citizens, without distinction of rank (B.C. 477). In 683, the office had been made annual, and the number of archons had been extended to nine. The year was named from the first A.; to the second, styled Basileus, belonged the care of religious affairs; the third was Polemarchos, or commander-in-chief; and the remaining six, having to conduct all criminal trials, were styled Thesmothetæ, or lawgivers.—Among the Jews, during the time of their subjection to the Romans, the title of A. had various meanings; but was generally given to the members of the Sanhedrim or supreme council.—In the mystical jargon of the Gnostics, the term A. was

frequently employed, and hence one of their sects, especially opposed to Judaism, received the name ARCHONTICS. See GNOSTICS.

ARCHYTAS, *âr-kī′tăs,* of Tarentum: one of the most illustrious men of antiquity; lived abt. B.C. 400. His father's name was Mnesagoras. A. is said to have been a contemporary of Plato, and on one occasion to have saved the life of the latter when the tyrant Dionysius wished to put him to death. His public career was glorious. He was seven times elected general of his city, though it was customary for the office to be held only for one year; and in every campaign which he undertook he was victorious. His civil administration was equally fortunate. Affairs of the highest moment were repeatedly intrusted to him; and yet, though deeply skilled in philosophy and politics, he had a childlike simplicity of character. He was drowned on the Apulian coast. A.'s virtues were as conspicuous as his talents. He paid the most humane attention to the comfort and education of his slaves, and although one of the greatest geometricians, he did not disdain to make a rattle for the amusement of his children. He solved the problem of the doubling of the cube, and secured almost the reputation of a magician by his numerous mechanical contrivances, the most wonderful of which was the flying pigeon. A Pythagorean in philosophy, he is generally supposed to have exerted a considerable influence on Plato, and some affirm that even the gigantic understanding of Aristotle was indebted to him for the idea of his categories. Only fragments of his writings remain. They relate to metaphysics, ethics, logic, and physics.

ARCIDOSSO, *âr-chē-dŏs′sō:* town of Central Italy, prov. of Grosseto, 23 m. n.e. from Grosseto, on a feeder of the Umbrone, among the Apennines. Pop. 2,000.

ARCIS-SUR-AUBE, *ar-sē′sür-ōb:* small town in the French department of Aube; lat. 48° 32′ n., long. 4° 8′ E.; remarkable for the battle, 1814, March 20-21, between Napoleon and the allied forces under Prince Schwartzenberg. The battle, beginning with several skirmishes on the first, and ending in a general engagement on the second day, when the French retreated over the Aube, was not in itself very important. But Napeleon now formed the plan of operating in the rear of the Allies, and left the road to Paris open; assuming that they would not venture to proceed without attempting to secure their rear. The Allies marched, nevertheless, on the capital, and thus decided the campaign. Pop. abt. 3,000.

ARC LAMP: see ELECTRICAL ILLUMINATION.

ARCOGRAPH, n. *ârk′ŏ-grăf* [L. *arcus,* a bow: Gr. *graphein,* to grave, to describe]: an instrument for describing an arc without the use of a central point; a cyclograph.

ARCOLA, *âr-kō′la,* or ARCO′LÉ: village on the left bank of the Adige, Northern Italy, 15 m. e.s.e. of Verona; famous for the victory gained by Bonaparte over the Austrians, 1796, Nov. 17. The Austrians, relieved by

the retreat of Moreau from the Rhine, had begun to take the offensive in Italy, and General Alvinczy appeared at the head of 50,000 men, with the main body of which he advanced to Caldiero, and threatened Verona. Bonaparte, recognizing the danger, descended by night the course of the Adige, crossed that river at Ronco, and was thus in a position to threaten the left flank of Alvinczy's army, which was posted at A. A causeway leads from Ronco across the morasses to A., before reaching which the road crosses the small stream of the Alpon by a narrow bridge. This bridge was defended by the Austrian general Mittrowsky, with fourteen battalions of infantry, and two squadrons of cavalry. On the 14th of November, Augereau attacked the bridge with two battalions of grenadiers, but being exposed in flank to the Austrian fire was obliged to withdraw. Bonaparte now seized the standard himself, and rushed on the bridge, followed by the grenadiers; but again the fire of the Austrians, who were in much greater force than the French, made it necessary to draw back. The struggle was renewed on the 16th, with a similar result; and it was only on the 17th that the French succeeded in getting possession of A., not, however, by forcing the bridge, but by sending a column across the Alpon, lower down, and getting in rear of the Austrians. On this Alvinczy was obliged to retreat to Vicenza. It fared no better with the other column of the Austrians under Davidovich. In this series of battles the Austrians lost 18,000 men killed, and 6,000 prisoners. The French loss was 15,000.

ARCON, *âr-sōn'*, Jean Claude d': 1733-1800; b. Pontarlier: a distinguished French engineer. He was originally intended for the priesthood, but on manifesting a decided preference for the study of Vauban, his father, an eminent jurisconsult, consented to his choice of a military profession. In 1754, he entered the Military School at Mézières, and in the following year he passed as an engineer. During the Seven Years' War, he acquired considerable reputation, especially in the defense of Cassel. His fertility of invention was surprising, and his writings show a rich and vigorous genius. He was even bold enough to question the wisdom of certain strategical propositions of the Great Frederick. But his most famous scheme was that by which he hoped to reduce Gibraltar, then in the hands of the English, and defended by Governor Elliot. He contrived floating batteries, incombustible, and not liable to sink, which, however, were not successful, though this is mainly to be attributed to the fact of his efforts being indifferently supported. When the French, under Dumouriez, overran Holland, A. took several strongly fortified places, among others Breda. After this, he retired from public life, and confined himself to the literature of his profession. His most important work is *Considérations Militaires et Politiques sur les Fortifications* (Paris, 1795). In 1799, Bonaparte called him to the senate, but he died the year after.

ARCOS DE LA FRONTERA, *âr'kōs dā lâ frŏn-tā'râ:* town on the right bank of the Guadalete, Andalusia, Spain. Its principal manufacture is that of tanned leather, which was the first established in Andalusia; thread and ropes are also made. A. has a wild and romantic situation, which harmonizes well with the picturesque garb of the inhabitants, who still wear the old national costume. It was called Arcos, from being built in the form of a 'bow'; and after Alfonso-el-Sabio had rescued it from the Moors, it received the additional name of *de la Frontera,* from its frontier position, being in the vicinity of the Moorish kingdom of Granada. Almost impregnable by nature, it was further more embattled with walls and towers, part of which still remain, and afford a magnificent view of the Ronda Mountains. The rich plains that lie below the rocky town are famed in the Spanish ballads for their breed of war-steeds, 'Arcos barbs.' Pop. (1900) 15,700.

ARCOT, *âr-kŏt'* properly ARKÁT: city of Hindustan, in the presidency of Madras, cap. of the dist. of n. Arcot; on the right bank of the Palar, a river which, rising in Mysore, is, in the rainy season, about half a mile wide before the town. It is in n. lat. 12° 54′, and in e. long. 79° 24′; 65 m. from Madras. Besides the military cantonment, which can accommodate three regiments of cavalry, A. contains some mosques in a passable state of repair, and the ruins of the Nawaab's palace. A. is noticeable chiefly for its history. It was the spot where Clive first firmly established his military reputation. With a force of 300 Sepoys, 200 Europeans, and three field-pieces, he marched against A., which was garrisoned by 1,100 men; and after having taken it, he stood a siege of fifty days against thousands of assailants, amid hardships and privations of every description. Pop. 11,000.

ARCOT: a portion of the presidency of Madras. It consists of two districts, the northern and the southern, of which the respective areas are 7,256 sq. m. and 4,873, and the respective populations about 1,817,814 and 1,814,738.

As most of the rivers are destitute of water in the dry season, there are thousands of tanks in A. Some of them are of enormous size; that of Cavery-pak, in particular, measures eight m. by three. These tanks are indispensable, as well for irrigation as for domestic use. The hot and parching winds from the west, sweeping down the valleys of the eastern Ghaats, are often fatal to birds on the wing, and also to human beings when exposed for any length of time. Glass cracks and flies in pieces, and wood shrinks, splits, and shivers; and from the mutual friction of the sapless trees spontaneous combustion sometimes takes place in the jungles.

ARCTIC, a. *ârk'tĭk* [L. *arctĭcus:* Gr. *arktĭkos,* near the bear, northern—from Gr. *arktos,* a bear, a cluster of stars in the north heavens called the Bear: F. *arctique,* northern]: pertaining to the north; northern; very cold. ARCTIC

REGIONS, the lands surrounding the north pole. ARCTIC CIRCLE, an imaginary line passing round the north pole at a distance from it equal to the obliquity of the ecliptic, or $23\frac{1}{2}°$. The corresponding circle round the south pole is the *Antarctic* circle. Within each of these circles there is a period of the year when the sun does not set, and another when he is never seen, this period being longer the nearer to the pole. ARCTIC CURRENT, an ocean-current which originates in the n. polar regions, and flows southward to the equator. ARCTIC SEA, the sea lying around the n. pole.

ARCTIC HIGHLANDS: name sometimes applied, not very appropriately, to that portion of the American continent between Hudson's Bay and the mouth of the Mackenzie. It has been the scene of all, or nearly all, the overland efforts in connection with the exploration of a Northwest Passage, from Hearne's discovery of the Coppermine down to the recent voyage of Anderson—the most prominent among the intermediate laborers having been Franklin, Richardson, Back, Dease, Simpson, and Rae.

ARCTIC OCEAN: that part of the universal sea which surrounds the north pole. Its single boundary, that towards the south, naturally divides itself into four sections—the n. shores respectively of the two continents, and the n. limits respectively of the two intercontinental oceans.

The A. O. meets the Pacific at Behring Strait, about 66° of n. lat., so that here the A. O. overlaps the Arctic circle by about 30′. On the side of the Atlantic the common border seems equally independent of arbitrary definition, for Scoresby Sound almost as definitely terminates the s.e. coast of Greenland as North Cape terminates the n. w. coast of Europe; so that, as both extremes are intersected by about the same parallel of 71°, the A. O. here falls short of the Arctic circle by about $4\frac{1}{2}°$.

In the old world, the A. O., if we include its gulfs, stretches s. of the Arctic circle, in the White Sea, fully 2°; while at Cape Severo, the most northerly point of Asia, lat. 78° 25′ n., it falls short of the same by 11° 55′. Lastly, within the range of the new world, the A. O., in its strict acceptation, is everywhere forced back within the Arctic circle, about 5° at Point Barrow, about $7\frac{1}{2}°$ on Barrow's Strait, and about 3° at the Strait of the Fury and Hecla.

The waters of the A. O., however, may conveniently be considered to extend beyond these their strict limits. So far as the mere aspect of the map is concerned, Davis's Strait, Baffin's Bay and Hudson's Bay may be regarded as gulfs rather of the Atlantic than of the A. O. But if essential characteristics are permitted to outweigh mere position, they must be assigned rather to the A. O. than to the Atlantic. Besides being all fed by currents from the A. O., they are all hyperborean in temperature. Even the most southerly of the three illustrates this. While Hudson's Straits present, in general, more ice than Davis's Strait or Baffin's Bay, Hudson's Bay itself has been the scene of per-

ARCTIC REGIONS
Scale of Miles
0 300 600
McClure, 1850-53
2 German Expeditions, 1869-70
Nordenskiold, 1878-79
DeLong, 1831
Nansen, 1893-90
Sverdrup, 1898-1902
Abruzzi, 1899-1900
Peary, 1906
PACIFIC OCEAN
ARCTIC OCEAN
ATLANTIC OCEAN
NORTH POLE
HIGHEST LATITUDE 87° 06' REACHED BY PEARY APRIL, 1906
NANSEN'S FARTHEST NORTH
ABRUZZI, 1900 86° 34'
PEARY 84° 17' APRIL 1902
NANSEN LEFT "FRAM" MARCH 14, 1895
JEANETTE SUNK JUNE 12, 1881
ARCTIC CIRCLE
WESTERN SIBERIA
EASTERN SIBERIA
NORTH AMERICA
GREENLAND
EUROPE
BRITISH ISLES
Meridian of Greenwich

haps the two most abortive, if not most disastrous, of all modern attempts at northern discovery. On opposite sides of Southampton Island, Lyons and Back were arrested by impenetrable packs, the one near the Bay of God's Mercy, and the other off Cape Comfort—the latter point being $1\frac{1}{2}°$, and the former being twice as much, s. of the Arctic circle. Reckoning, therefore, to the bottom of James's Bay, as an arm of Hudson's, the arctic seas, thus appended to the A. O. proper, reach as far s. as the parallel of London.

Little as is yet known, at least accurately, of the A. O., its discovery and exploration have developed and tasked more skill and heroism than perhaps the exploration and discovery of all the rest of the world since the age of Columbus. Without anticipating what is to be said on this subject under the titles of NORTHEAST PASSAGE, NORTHWEST PASSAGE, and POLAR EXPEDITIONS here may be stated summarily the comparatively easy labors of the Russians while issuing, as it were, from their domestic rivers to survey their domestic shores. About a century and a quarter ago, the Muscovites simultaneously sent forth five expeditions to complete, if possible, the Northeast Passage. From the White Sea to the Obi, four seasons were consumed; from the Obi to the Yenisei, four seasons; from the Yenisei to the Lena, season after season was spent in both directions without success; from the Lena to the Kolyma, six seasons were occupied; from the Kolyma to the Pacific every effort was fruitless, though the Cossack Deshneff was known to have accomplished this part of the enterprise about a century before.

Arctic navigation is beset by almost every imaginable difficulty and danger. In addition to the peculiar perils of ice in all possible states, the adventurer, often blinded by fogs and snows, has to face, generally without guide or sea-room, the storms, tides, and currents of comparatively unknown waters. If such be his three months of summer, what must be his nine months of winter! On the parallel of 73°, and under a temperature of 15° below zero Fahr., Capt. McClure spent the night of 1851, Oct. 30, on the ice, amid prowling bears, and that without food or ammunition—his only guide being a pocket-compass, useless in the dark.

A combined series of expeditions were sent forth in 1882 by the various European countries and the United States, to spend the winter in a high latitude and make careful observations in terrestrial magnetism and meteorology, as well as in geography and other branches of science. Nine stations were equipped so as to form a kind of ring round the north pole and during the winter 1882-83, valuable observations were recorded at the stations in Jan-Mayen, Lapland, Spitzbergen, Nova Zembla, Sagastyr Island (mouth of Lena), Point Barrow, Great Slave Lake, Lady Franklin Bay, and Cumberland Sound.

Notwithstanding the labors and researches of two centuries and a half, very little of this vast ocean has been

even seen by man. To the n. of 87° 6′, in fact, the A. O., so far as authentic evidence goes, is a mere blank to geographers; for Parry, 1827, barely reached lat. 82° 45′; Kane, in 1854, touched only 81° 22′; the *Polaris*, in 1871, reached only 82° 16′; in 1874, the Austro-Hungary Polar Expedition just reached 82° 5′; the British Expedition of 1875-76 could advance no further than 83° 20′; Greely in 1884 reached only 83° 24′; Nansen in 1896 reached 86° 14′; the Duke of Abruzzi in 1900 touched 86° 33′ and Peary in the expedition of 1905-6 succeeded in reaching only as far as 87° 6′; then the highest latitude attained. At all the intermediate points of longitude, the northern limit of geographical knowledge falls short, more or less at every point, of the parallel of 87°. This untrodden world, however, is not to be regarded as a continuous wilderness of ice. Parry, at his furthest point, found not an unbroken field, but separate floes, with more or less of open water between them—the mildness of the temperature being indicated by falls of rain; and Kane, again at his furthest point, saw a free sea to the north, as far as the eye could reach, from a promontory 240 ft. high; while, to use his own words, 'a gale from the n.e., of 54 hours in duration, brought a heavy swell from that quarter without disclosing any drift or other ice. This is quite in keeping with the fact already noticed, that Hudson's Straits and Bay are often more encumbered with pack than the waters of far higher latitudes. With regard to currents, Parry, during nearly the whole of his boat-sleigh expedition of 1827, found that his place by reckoning was considerably ahead of his place by observation, or, in other words, that his northward progress on the floes was neutralized more or less by the southward progress of the floes themselves, the existence of a current towards the south being thus shown. McClure derived advantage from the current whether advancing through open water or drifting along at the mercy of the pack. The experience of Weyprecht and Payer was different from that of any preceding navigators, since they found that they steadily drifted *north*. While McClure had the fortune to return with the news of the discovery of the Northwest Passage, McClintock has shown that the discovery must have been anticipated by Sir John Franklin. Succeeding expeditions, of which a great number have been equipped by England, Germany, France, Sweden, the United States, Austria, and Denmark, have been directed mainly towards the north pole. The reports of the expedition of 1875-76 led to the conclusion that the pole is surrounded by an inaccessible region of ice, to which has been given the name of the Palæocrystic Sea, or Sea of Ancient Ice. The Northeast Passage was accomplished for the first time by Professor Nordenskiöld in 1878–79; and repeated successful voyages have been made. In 1905 Amundsen sailed through the Northwest Passage.

The only section of the southern A. O. that is mod-

erately well known to a distance from the continent is that which washes the n.e. of America. It contains, under the collective name of Polar archipelago, many large islands. Off the coast of the old world are Spitzbergen, Nova Zembla, New Siberia, Wrangel Land, King Charles Land, etc. Weyprecht and Payer, 1873, discovered Franz Josef Land, an extensive and mountainous tract, lying about 200 m. due n. of Nova Zembla. Its s. coast is in about 80° n. lat., and it was seen to extend as far n. as 83°, occupying at least 15 degrees of longitude. The chief straits are Lancaster Sound, Barrow's Strait, Smith's Sound, Strait of the Fury and Hecla, Wellington Channel, Banks Strait, etc.; the chief rivers are the Obi; the Yenisei; the Lena; the Mackenzie; the Yana; the Indigirka; the Kolyma and many others.

Capt. Otto Sverdrup, in Nansen's ship, the *Fram*, left in June and returned 1902, Sept. 19. He discovered what is believed to be the farthest land lying between the American continent and the pole w. of Greenland; a great island north of the Parry islands. Peary, 1898–1902, explored and mapped large parts of Ellesmere Land and Grinnel Land, rounded the northern coast of Greenland, and reached lat. 84° 17′. In 1899, June, the Duke of Abruzzi led an expedition in the *Stella Palace*. Some of his party in sledges reached (1900) lat. 86° 33′ n. The following are the farthest points of north latitude reached by Arctic explorers up to the present date: 1607, Hudson, 80° 23′; 1773, Phipps, 80° 48′; 1806, Scoresby, 81° 12′ 42″; 1827, Parry, 82° 50′; 1874, Meyer (on land), 82°; 1875, Markham and Parry (Nares' expedition), 83° 20′ 26″; 1876, Payer, 83° 7′; 1884, Lockwood, (Greely's party), 83° 24′; 1896, Nansen, 86° 14′; 1900, Abruzzi, 86° 33′; 1905–6, Peary, 87° 6′.

The principal commercial product of the A. O. has been the whale. The whale fisheries on the w. of Spitzbergen, and on both sides of Greenland, scarcely need be mentioned. On the side of East Siberia, however, the A. O. produces a more remarkable article of traffic. Here are found, in the greatest abundance, the bones of the mammoth. Spring after spring, the alluvial banks of the lakes and rivers, crumbling under the thaw, give up, as it were, their dead: while the islands lying off the Yana teem with these memorials of antiquity. The American half of the A. O., if it cannot boast of fossil ivory, presents something still more difficult to be explained. In lat. 74° 25′, and lat. 76° 15′ respectively, Captain McClure and Lieutenant Mecham discovered large deposits of trees, apparently indigenous, of considerable size.

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Arctic Explorations, the Second Expedition in Search of Sir John Franklin; Nansen, *Farthest North;* Peary, *Northward Over the Great Ice;* Ray, *Report of the Expedition to Point Barrow;* Wright, *Greenland Ice Fields and Life in the North Atlantic.*

ARC'TUM: see BURDOCK.

ARCTURUS, n. *ârk-tū'rŭs* [Gr. *arktos*, a bear; *oura*, a tail]: a fixed star of the first magnitude, in the constellation Boötis, which is situated behind the tail of the Great Bear.

ARCUS SENILIS, *ârk'ŭs sĕn-ī'lĭs:* a not very well chosen term for change occurring in the cornea of the eye, in consequence of fatty degeneration of its marginal part. The term is objectionable, because the change usually commences before the advent of old age, and, further, because the *arcus*, or arch, is usually converted into a complete circle by the time that the patient has reached the age of sixty or seventy years. The *arcus senilis* usually commences at or even before the age of forty years, as an opaque whitish cresent, skirting either the upper or lower margin of the cornea; and from this commencement it extends along the edge, till it finally becomes a complete circle, which sometimes assumes a chalky whiteness, and gives to the eye a very peculiar appearance. On careful examination, it may be seen that a narrow interval of partially clear cornea always intervenes between the arcus and the opaque sclerotic. The formation of this circle is of little importance.

ARD, *ârd,* or AIRD: a Celtic root, meaning 'height' (cf. Lat. *arduus*, high), which appears in many geographical names, especially in Ireland and Scotland.

ARDAHAN, *ar-dâ-hân':* village of about 300 houses in the portion of Turkish Armenia ceded in 1878 to Russia; 35 m. n.w. of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854–56; in 1878, the Berlin Congress sanctioned the cession to Russia of A., which had been captured early in the war. On account of the severity of the climate the houses of A. are mainly underground constructions.

ARDASSINE, n. *âr-dăs'sĭn* [Fr. *ardassine:* Ar. and Per. *ardan*, a kind of raw silk]: the finest kind of Persian silk used in the French looms.

ARD'EA: see HERON.

ARDEB, n. *âr'dĕb* [Ar. *irdab* or *urdab*]: measure of grain containing almost eight bushels, used in the parts of Africa where the Arabs most abound.

ARDECHE, *âr-dāsh':* dept. in the s. of France, taking its name from the river A., a tributary of the Rhone; includes the most northern part of ancient Languedoc. Greatest length from n. to s., 74 m.; greatest breadth, 44; 2,130 sq. m. A. is almost wholly mountainous. In the n.w. of the dept., the Cevennes culminate in the volcanic Mont-Mezène, 5,972 ft. in height. The variety

of the numerous extinct volcanic peaks, deep craters, rugged valleys, masses of tufa, grottoes, rock-labyrinths, ranges of basaltic columns, gigantic dams, etc., give an extraordinarily picturesque scenery. The upland, which has winter for six or eight months, is devoted to pasturage; but the terraces and valleys near the Rhone have a warm climate, and produce good wine (white and red), olives, figs, almonds, chestnuts, etc. There are manufactures of silk, paper, leather, iron, etc., and good roads with water-carriage, facilitate commerce. Lead, iron, copper, manganese, etc., are wrought. The chief towns are Privas, Aubenas, Bourg, St. Andéol. Pop. (1901) 353,564.

ARDENCY, n. *âr'dĕn-sĭ* [L. *ardens* or *arden'tem*, burning: OF. *ardant*, burning]: a state of burning; warmth of passion; zeal; eagerness. AR'DENT, a. burning; eager; zealous. AR'DENTLY, ad. *-lĭ*. ARDOR, n. *âr'dėr* [F. *ardeur* —from L. *ardor*, burning]: heat; warmth; fervency; affection. ARDENT SPIRITS, distilled spirits—so named from their hot, burning qualities.

ARDENNES, *âr-dĕn':* the w. division of the slate-plateau of the Lower Rhine. It extends over portions of Belgium, France, and Rhenish Prussia, and consists of a broken mass of hills, for the most part of no great elevation, which gradually slope towards the plains of Flanders. In early times, the name was given to the whole of the region lying between the Rhine and the Sambre, a length of about 160 m. The average height of the hills is less than 1,800 ft.; but in the e. Mont St. Hubert attains an elevation of 2,100 ft. Large tracts of this region consist not of hills, but of gently undulating plateaus densely covered with oak and beech forests, while other portions are marshy, heathy, and barren. The districts through which the Meuse and other rivers flow present some extraordinary appearances. The channel of the river is sometimes bound in by rugged and precipitous cliffs more than 600 ft. high. The principal rocks of the A. are clay-slate, grauwacke, quartz, etc., interspersed with extensive strata of primitive limestone.

ARDENNES: a frontier dept. in the n. of France, bordering upon the provs. of Namur and Luxembourg in Belgium. It formed a part of the old prov. of Champagne. Length, from n. to s., 63 m.; breadth, from e. to w., 60; area, 2,020 sq. m. The n.e. of A. belongs to the basin of the Meuse; the s.w. is watered by the Aisne; both of these rivers are enriched with affluents, and united by the *Canal of A.* About one-eighth of the whole surface is hilly, and covered with forests and wide tracts of pasturage. In the n. extremity of the dept., near Givet, marble is obtained; but the prevailing rock is limestone, veined with lead and iron. South of this, and stretching across the dept. from e. to w., are great layers of slate, with here and there flint, quartz, etc. In the s.e., muschelkalk, rich in iron-ore, abounds; and in the s.w., the soil is composed of arid chalk,

a naked, treeless, elevated plain. Only the valleys are fertile, and produce corn. The vine is cultivated only at Mézières, in the southwest. Slate, marble, and iron, and porcelain-clay and sand for making glass are obtained. Excellent work-horses and sheep are reared. There are manufactures of earthenware, glass, marble, woolen cloths, metallic wares, etc. The principal towns are Mézières, Rethel, Roeroy, Vouziers, and Sedan, where Napoleon III. surrendered to the Prussians, 1870, Sept. 2. Pop. (1901) 315,589.

ARDNAMURCHAN POINT, *ârd-nă-mĕr'kăn:* the n.w. promontory of Argyleshire, and the extreme w. point of the mainland of Britain. A light-house was erected here in 1849, visible at a distance of 20 miles. For 10 m. around, the country consists of trap, resting on sandstone often hardened, and blue slates. The trap veins form many striking reticulations in the strata. South of the point are found numerous oolitic and lias fossils.

ARDOCH, *ar'dok:* small village in Scotland, county of Perth, 8 m. s.s.w. of Crieff, celebrated for a Roman camp, the nearest entire now in Britain. The camp is 2½ m. n. of the Greenloaning station of the Caledonian railway, in the grounds of A. House. The intrenched works form a rectangle, 500 by 430 ft., the four sides facing the cardinal points. The n. and e. sides are protected by five ditches and six ramparts, these works being 270 ft. broad on the n. side, and 180 on the east. A deep morass is on the s.e., and the perpendicular banks of the Knaig Water, rising 50 ft. high, protect the camp on the west. The prætorium, or general's quarter, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a sq. of 60 ft. each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaig. Not far n. of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist. A mile w. of A., an immense cairn of stones lately existed, 182 ft. long, 45 ft. broad at the base, and 30 ft. in sloping height. A human skeleton, 7 ft. long, in a stone coffin, was found in it.

ARDOYE, *ar-dwâ':* t. of Belgium, prov. of W. Flanders, 17 m. s. from Bruges. Pop. 6,500.

ARDROSSAN, *ar-drŏs'săn:* small seaport and summer bathing-place in Ayrshire. Its harbor, sheltered by an island, is one of the safest and most accessible on the w. coast of Scotland, and has been greatly improved, at vast expense, by the earls of Eglintoun. There is a large export of coal from this place, and ship-building is carried on. On a hill above the town stand the ruins of A. Castle, said to have been surprised by Wallace when held by the forces of Edward I. Wallace destroyed the garrison, and threw the dead bodies into a dungeon called 'Wallace's Larder.' Pop. (1901) 5,933.

ARDUOUS, a. *ar'dū-ŭs* [L. *ar'duus*, steep, inaccessible]:

of difficult attainment; attended with great labor. ARDUOUSLY, ad. *-ŭs-lĭ.* ARDUOUSNESS, n. *ârˈdū-ŭs-nĕs.*

ARE, v. *âr* [Dan. *ere:* Sw. *ære:* Icel. *eru*, are: Sw. *vara:* Dan. *vaere*, to be, to exist]: part of the verb *be.* ARE NOT, do not exist.

ARE, n. *air* [L. *ārĕă*, an open place]: the unit of the French land-measure, a square, the side of which is 10 metres (or 32,809 ft.) long (see METRE), and which, therefore, contains 100 sq. metres = 1,076 English sq. ft. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares, = 2·47 English statute or imperial acres.

AREA, n; *āˈrĕ-ă* [L.]: any inclosed or open space; an open space in front of or around a sunk flat or floor of a building. As a term of *math.*, it means *quantity of surface.* The calculation of areas, or mensuration of surfaces, is one of the ultimate objects of geometry. The measuring unit is a square inch, a square foot, etc., according to the unit of length. As a figure is thus measured by finding an equivalent for its surface in *squares*, the process is sometimes called the *quadrature* of the figure.

AREAD, AREED, or AREDE, v. *ă-rēdˈ* [AS. *aræd*, counsel; *arædian*, to read; *ræden*, to interpret, to read: Goth. *redan*, to counsel, to provide]: in *OE.*, to advise; to declare; to show; to read.

ARECA, n. *ă-rēˈkă:* a genus of palms containing several species, having pinnate leaves and double spathes. The fruit is a fibrous one-seeded drupe, a nut with an outer fibrous husk. *A. Catechu*, the PINANG PALM, or Betel-nut Palm, is a native of the East Indies, whose nut yields a sort of catechu. See CATECHU. This Areca-nut or Betel-nut is very much used in all parts of the East, the chewing of it with quick-lime and the leaf of the betel-pepper being one of the most prevalent habits of the people. See BETEL. The nut is about the size of a hen's egg; the fibrous husk about half an inch thick. It is austere and astringent. It is doubtful if it possesses a narcotic power, or if this is to be ascribed entirely to the leaf which is used with it. Areca-nuts are a considerable article of trade in the East. The timber of the palm which produces them, and its leaf-stalks and spathes are also used for domestic purposes. The tree is often 40 or 50 ft. high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets more than a yard long. In Malabar, an inebriating lozenge is prepared from the sap.—*A. oleracea*, the CABBAGE PALM of the West Indies, is a very tall tree, 100–200 ft., whose huge terminal leaf-bud is sweet and nutritious, and is sometimes used for the table as cabbage, but when it is cut off the tree is destroyed. The stem of this tree, notwithstanding its great height, is remarkably slender. The nuts are produced in great numbers; they are about the size of a filbert, and have a sweet kernel.—*A. sapida*, the New Zealand Palm, is remarkable as extending southward beyond the geographical limits of any other of its order, as far indeed

as lat. 38° 22′ s. It is a small palm, only from 6 to 10 ft. high, with leaves 4–6 ft. long. The young inflorescence is eaten.

ARECIBO: a seaport of Porto Rico; on the n. coast; 50 miles w. of San Juan. The harbor is very poor, having neither natural nor artificial protection, and is, therefore, exposed to the full force of the ocean. Imports and exports are handled only by twice lightering. The town is built around a plaza from which streets run at right angles. Pop. (1903) 12,000.

ARENA, n. *â-rē′nă* [L. *arēna*, sand]: a part of an amphitheatre (so called because it was usually strewed with sand, though when a fit of extravagance seized the Roman emperors they used borax and cinnabar instead), where the combats of gladiators and wild beasts took place. It had four main entrances, and was surrounded by a wall about 15 ft. high, so that the spectators were perfectly safe. The name was afterwards applied by the Romans to any building for exhibition of baiting animals, horsemanship, etc. On the continent of Europe the name has been given to large summer theatres for dramatic performances in the open air.

ARENACEOUS, a. *ăr′ĕ-nā′shŭs:* composed of grains or particles of sand; having the properties of sand.

Arena′ceous Rocks: rocks composed entirely, or to a large extent, of grains of silex. Beds of loose sand occur extensively in the more recent deposits. The grains, either of quartz or flint, are generally water-worn and rounded. In older deposits, the grains of sand are bound together by silicious, calcareous, argillaceous, or ferruginous cements. It is seldom that a rock is composed of quartzy materials alone; grains or particles of other mineral substances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; and they often occur in layers parallel to the planes of stratification, causing the rock to split into thin slabs, and exposing a glittering surface. These are called *micaceous sandstones.* When grains of feldspar occur, it is a *feldspathic sandstone.* Often large quantities of calcareous matter, either as cement or as distinct grains, occur; and these are called *calcareous sandstones.* The presence of lime can always be detected by the effervescence which takes place on the application of muriatic or other acid. When the sandstone is coarse-grained, it is usually called *grit.* If the grains are large enough to be called pebbles, it becomes *conglomerate* or *puddingstone;* if the fragments are sharp and angular, it is called *breccia.*

ARENARIA, *ăr-ē-nā′rĭ-ă,* or Sandwort: genus of plants of the natural order *Caryophylleæ,* differing from Stellaria (Stitchwort, q.v.) chiefly in the undivided petals. The species are numerous, annual and perennial herbaceous plants of humble growth, rarely somewhat shrubby, natives of the temperate and colder parts of the world. Some are arctic and alpine plants. Many are found chiefly in sandy

soils. The flowers are generally small and inconspicuous, but, if closely examined, are seen to possess no little beauty.

ARENATION, n. *ăr-ē-nā'shŭn* [L. *arenatio*, from *arenare*, to sprinkle with sand]: in *med.*, a sand-bath; sprinkling hot sand upon the body

ARENDAL, *â'rĕn-dâl':* town on the s.e. coast of Norway, near the mouth of the Nid-elf in the bay of Christiania. It is built partly on piles, partly on rock, and this with its situation gives it a very romantic aspect. The bay, protected by the island of Tromöe, forms an excellent harbor, and favors the commerce of the town, which is considerable, in proportion to its size. A. is intersected by canals; its exports are iron from the neighboring mines, and wooden articles. Ship-building is carried on; and on a smaller scale, distilleries and tobacco-factories. King Louis Philippe, after the French Revolution, when wandering in the north as Duke of Orleans, made some stay here. Pop. 4,000.

ARENDALITE, n. *ă-rĕn'dăl-īt.* [In Ger., *arendalit*, from *Arendal*, near which it is found]: a mineral, a subvariety of ordinary Epidote. It generally occurs in dark-green crystals.

ARENDATOR, n. *ăr'en-dā'tor* [L. L.]: in Livonia and other provinces of Russia, one who farms the rents or revenues; one who contracts with the crown for the rents of the farms.

ARENG', or ARENGA. see GOMUTO PALM.

ARENI'COLA: see ANNELIDA.

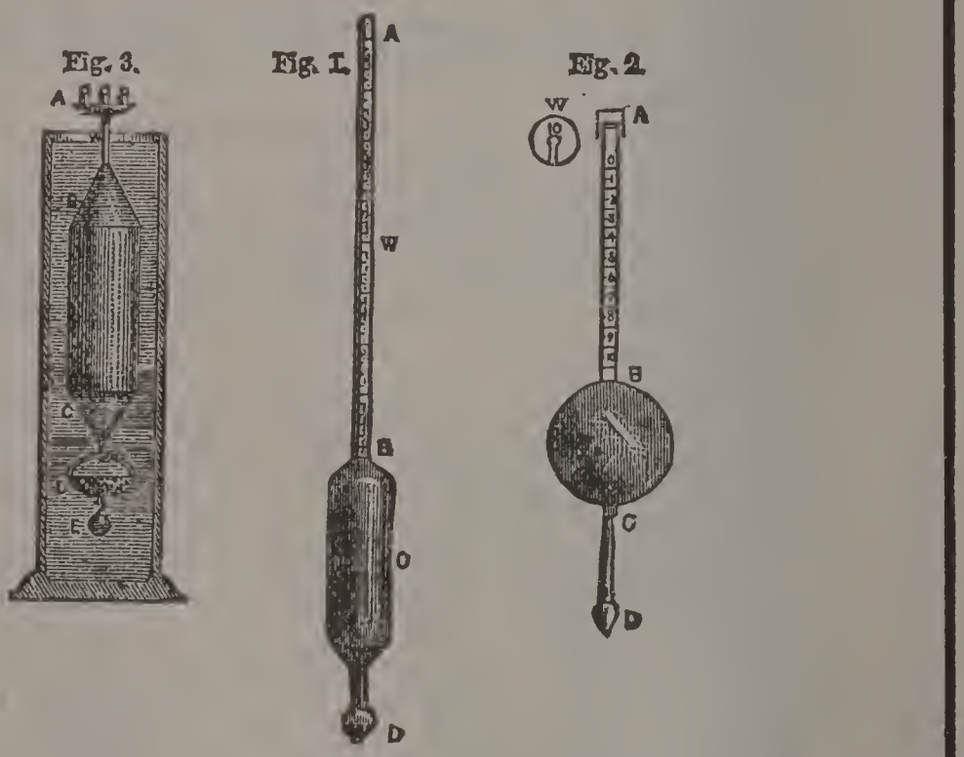
ARENICOLITES, n. plu. *ăr'ĕ-nĭk'ŏ-līts* [L. *arēna*, sand; *colo*, I inhabit; Gr. *lithos*, a stone]: a term used to designate those circular holes or markings which appear on the upper surface of many sandstones, having apparently been worm-burrows.

ARENILITIC, a. *ă-rĕn'ĭ-lĭt'ĭk* [L. *arēna*, sand: Gr. *lithos*, a stone]: of or like sandstone. ARENOSE, a. *ăr'ĕ-nōs*, or ARENOUS, a. *ăr'ĕ-nŭs*, sandy. ARENARIOUS, a. *ăr'ĕ na'rĭ-ŭs*, sandy; composed wholly or in large part of sand. ARENULOUS, a. *ă-rĕn'ū-lŭs*, full of sand; gritty.

AREOLA, n. *ă-r'ĕŏ-lă* [L. *ărĕŏla*, a small open space, a small garden-bed: F. *aréole*]: the colored circle round the nipple or a pustule. ARE'OLÆ, n. plu. *-lē*, small interstices of cellular or other tissues; little spaces on the area or surface. AREOLAR, a. *ă-rē'ŏ-lĕr*, of or like an areola. AREOLATE, a. *ă-rē'ŏ-lāt*, marked by areolæ, or little spaces or cavities. ARE'OLA'TION, n. *-shŭn*, any small space distinctly bounded by something different in color, texture, etc. AREOLAR TISSUE, the tissue that loosely connects skin with muscle, and also forms a soft connective packing between muscles, around blood-vessels etc., and is composed mainly of interlaced 'white fibrous' and 'yellow elastic' tissues.

AREOMETER, n. *ār′ĕ-ŏm′ĕ-tĕr* [Gr. *araiˈos*, rare, thin; *metron*, a measure]: an instrument for measuring the specific gravity of liquids. AR′EOM′ETRY, n. *-trĭ*. AR′EOMET′RICAL, a. *-rĭ-kăl*, pertaining to.

AREOMETER [Fr. *aréomètre*, or *pèse-liqueur:* Ger. *Aräometer* or *Senkwage*], called also HYDROMETER: an instrument which is allowed to float freely in liquids, to determine their specific gravity or that of solid bodies. By specific gravity (q.v.) is meant the ratio that the weight of any volume of a substance bears to the weight of the same volume of water. Thus, a cubic foot of alcohol weighs 793 oz., while the same quantity of water weighs 1,000 oz.; the specific gravity of alcohol is set down, therefore, as $\frac{793}{1000}$ or ·793. A cubic foot of sulphuric acid weighs 1,841 oz., and has, consequently, a specific gravity of 1·841. These relations are not confined to the particular volume, one cubic foot, of these bodies, but hold for any equal volumes of them. Equal volumes of alcohol, water, and sulphuric acid have always to each other the ratio respectively of 793, 1,000, and 1,841; and this is only an instance of the general principle, that equal volumes of different substances have weights bearing to each other the direct ratio



Areometers.

of the specific gravities of these substances. This is the principle on which arcometers with weights, or weight-areometers, are constructed. If, however, equal weights of any two of these liquids were taken, it would be found that .793 of a cubic foot of water would weigh as much as 1·000 cu. ft. of alcohol; 1·000 cu. ft. of sulphuric acid as much as 1·841 cu. ft. of water; or ·793 cu. ft. of sulphuric acid as much as 1·841 cu. ft. of alcohol: more generally thus—when equal weights of two different fluids are taken, the

volumes of each are inversely as their specific gravities. On this latter principle depends the use of areometers with scales, or scale-areometers. The scale-A. is employed much more commonly than the weight-A., and is, in consequence, a much more important instrument. Of the various forms of scale-areometers, that contrived by Gay-Lussac deserves particular notice, from the simplicity of the mode of graduation; and an account of it will give the best idea of the general nature of such instruments. See Fig. 1. It consists of a uniform glass tube, AB, blown into two bulbs, C and D, at the bottom. The lower bulb, D, is loaded with mercury, so that when the instrument floats in any liquid the stem, AB, is maintained in a vertical position. Suppose that the quantity of mercury is so adjusted that when placed in water the A. sinks to the point W, which may in consequence be called the water-point. According to the principle of Archimedes, the weight of the volume of water displaced by the instrument up to this point is equal to the weight of the instrument. Suppose, for the sake of simplicity, that the water so displaced is a cubic inch, the weight of the A. will be that of a cubic inch of water, or 250 grs. (more correctly 252·5 grs. at 60° F.). If the A. be now placed in a fluid heavier than water, such as a mixture of sulphuric acid and water having a specific gravity $\frac{5}{4}$ or 1·25, it is manifest that if it is sunk again to the water-point, the displaced fluid would weigh $\frac{5}{4}$ of $250 = 312\frac{1}{2}$ grs., or $62\frac{1}{2}$ grs. more than the weight of the instrument. As much, therefore, of the stem of the A. must rise above the liquid as will reduce the weight of the displaced liquid to 250 grs., or reduce the volume to $\frac{4}{5}$ of what it was before. If the stem in this case rises to B, the volume displaced by the part WB is $\frac{1}{5}$ of the volume displaced by the instrument at the water-point. If the whole be divided into 100 parts, and the mark 100 be at W, B must be marked 80, as the A. displaces up to that point $\frac{4}{5}$ of 100; and if the intervening space on the stem be divided into 20 equal parts, each of them will correspond with $\frac{1}{100}$ of the water volume—viz., ·01 of a cubic inch, or with $\frac{1}{100}$ of the weight of the instrument—viz., 2·5 grs. If the same scale be carried above the point W., and the divisions marked as ascending from 100, the A. will be serviceable likewise for fluids less dense than water, and will mark the volumes which it displaces in each of them. The A. thus graduated gives immediately the volumes which it displaces in different liquids; and from these, seeing that it displaces in every case a weight of liquid equal to its own, the specific gravities may be calculated according to the principle already stated—viz., that equal weights of two different fluids have volumes inversely as their specific gravities. If, in a mixture of sulphuric acid and water, the A. stands at 90, according to the above principle 90 volumes of the mixture weigh as much as 100 of water; therefore its specific gravity is $\frac{100}{90}$ or $1\frac{1}{9}$. Again, if in a mixture of spirits and water it should stand at 110, 110 volumes of the mixture weigh as much as 100 of water, so that its specific gravity is $\frac{100}{110}$, or $\frac{10}{11}$. In all cases, then, 100 is to be divided by the number read on

the A., to determine the specific gravity of the liquid in which it floats.

The delicacy of the A. depends on the distance of the divisions on the scale, or on the thinness of the stem compared with the bulbs. An instrument possessing this advantage cannot be made to serve both for liquids heavier and lighter than water, for the stem would be of an inconvenient length; and it is usual to construct two areometers—one marked with the water-point at the top, and the scale descending to 50, for fluids heavier than water; and the other, with the water-point at the bottom, and the scale ascending to 150, for fluids lighter than water. The scale is generally marked on a slip of paper fixed inside the stem. Gay-Lussac's A. is known also under the name 'volumenometer.' Although it cannot be surpassed either for accuracy or simplicity, it is much less used than other instruments of a similar nature furnished with arbitrary scales, requiring the aid of tables to interpret the readings. The best known of these is Twaddle's A., used in England; and Beaumé's A., extensively adopted on the continent of Europe. The A. with an equally divided scale is a very ancient instrument; it was known among the Greeks under the name of 'baryllion.' On some areometers the divisions are not at equal distances, but are so drawn as to give at once, without table or calculation, the specific gravity of the fluid in which they are placed. Although very desirable, in practice they do not possess the accuracy of the A. with equally divided scales, because the graduation of them is attended with considerable difficulty.

No form of A. can be made to determine specific gravities with perfect accuracy, and such instruments are only useful where a ready and good approximation is all that is needed. They are, in consequence, employed chiefly to ascertain the specific gravity of the various liquors and solutions which occur in the arts and manufactures, and very frequently they are graduated with reference to special liquids, as spirits, wine, milk, brine, etc. The Alcoholometer or Hydrometer of Sykes is an instrument of this latter description, and is used by excise officers for estimating the strength of spirits. It is represented in Fig. 2. BC is a hollow brass ball, surmounted by a flat stem, AB, and loaded below by a short conical stem, CD, terminated by the pear-shaped bulb, D. It is accompanied by eight weights, by which the weight of the instrument may be increased, and the range of the scale extended to fluids heavier as well as lighter than water. One of these weights, W, is shown in the figure; it is furnished with a slit, so as to allow of it being slipped on to the narrowest part, C, of the lower stem. The stem, AB, is graduated into 11 equal parts, and these again into halves; and the instrument is so adjusted that its indications give the volumes of water that must be added to or taken from 100 volumes of the mixture under examination to reduce it to proof spirit (see ALCOHOL), which is a mixture of nearly equal parts of water and alcohol. Thus, if the A. indicates 11 over-proof, 11 volumes of water must be added in order to bring the liquid down to proof-

strength; and 100 gallons of such strength would be reckoned as 111; 100 gallons, at 11 under-proof, would in the same way be charged as 89. Very carefully constructed tables accompany the instrument, in which the specific gravity and percentage of alcohol of different mixtures, at different temperatures, are marked, corresponding to each degree of the A. Since the specific gravity of alcohol is known, it might be thought that if that of a mixture of it with water were known, the relative proportions of each would also be known. This, however, is not the case, for alcohol and water possess a chemical affinity for each other, which causes the combined volumes of the two to measure less than the two volumes separately. Thus, 50 volumes of alcohol mixed with 50 volumes of water do not make 100 volumes of the mixture, but only 96, and thereby the specific gravity of the mixture is higher than it would have been if no contraction had taken place. As the law of this contraction is very complicated, the relative proportions of the two in a combination of given specific gravity are to be estimated only from tables founded upon experimental data.

The peculiar feature of areometers with weights is, that instead of a scale they have only one mark on the stem, to which the A. is in all cases sunk. One of the best-known instruments of this kind is the A. of Nicholson. It consists of a brass tube, BC (Fig. 3), abt. 1 inch in diameter, closed above and below by conical ends, to the upper of which a wire is fixed, carrying on the top of it a cup, A, capable of containing the weights; and to the lower a hook is attached, from which hangs the cup, D. The lower part of the cup, D, is also provided with a hook, and the whole instrument is kept vertical, partly by the weight of the cup, and partly by the weight of the ball, E, suspended from it. On the wire a notch, W, is made, to serve as the mark or fixed point to which the A. is sunk. The specific gravities of liquids are determined by Nicholson's A. in the following way: The weight of the A. itself is first ascertained—let it be in a given case 2,000 gr.—it is then put into water at the temperature 60° F., and weights (say 500 gr.) put in, till it is sunk to W. It is now removed to the liquid under examination; and if the weight required to sink the instrument now to the standard point be only 100 gr. we have the specific gravity of the liquid equal to $\frac{2100}{2500}$ or $\frac{21}{25}$. In both fluids the same volume has been displaced, and that is in each case equal to the weight of the A; but the weight of the A. in the second case was 2,000 + 100, and in the former, 2,000 + 500; hence the above result. Nicholson's A. is seldom used for finding the specific gravity of fluids; its use is almost entirely restricted to ascertaining that of small solid substances, as gems and small pieces of minerals. The following example will show how this is done: If in the cup of the A. already mentioned, when placed in water, the gem be put, and only 440 gr. be then necessary to bring the instrument to W, 60 gr. is manifestly the weight of the gem, because 500 gr. were needed without it to do the same thing. The gem is next placed in the

lower cup, D, and if 460 gr. are now needed to sink the A. to the standard point, the gem has thus lost 20 gr. of its weight by being immersed in the water. According to the principle of Archimedes (q.v.), these 20 gr. are also the weight of a volume of water equal to that of the gem; so the specific gravity of the gem is $\frac{60}{20}$, or 3. By reversing the cup, D, which is furnished with perforations to allow free passage to the air, and attaching the weight, E, to the handle of it, the specific gravity of substances lighter than water may also be determined by this instrument. The other forms of weight-areometers are those of Fahrenheit, Tralles, and Charles. For the more accurate determination of the specific gravities of liquids and solids, see SPECIFIC GRAVITY

AREOPAGUS, *ăr'ē-ŏp'ă-gŭs* [L.—from Gr. *areï'os*, belonging to Mars: *Arēs*, Mars, and *pagos*, a hill]: a mount lying w. of the Acropolis, at Athens, and celebrated as the spot where the most venerable court of justice in ancient times held its sittings. AREOPAGITE, n. *ăr-ē-ŏp'ă-jīt:* a member of the Areopagus.

It is not easy to determine satisfactorily why the Athenian hill obtained its name; probably it was on account of sacrifices having been offered there in early times to the God of War; but all its historic importance is derived from the Areopagitic Council, the origin of which reaches far back into antiquity, and is ascribed by some to the semi-mythological Cecrops. Orestes, according to tradition, was tried before this court, and it is certain that it must have existed long before the first Messenian war (B.C. 740), for the Messenians, in offering to submit to its decisions certain points of dispute, speak of it, even then, as 'old.' Solon, however, made many changes in its constitution, enlarging its sphere of jurisdiction to such an extent that it ceased to be any longer a mere criminal court, and acquired henceforth social and political powers in addition to the former. Before Solon's time it was strictly oligarchical. It now became a *tertium quid* between aristocracy and democracy, the new qualification for office introduced by Solon being *property* instead of *birth*. It thus naturally allied itself with aristocracy, so that we can perfectly understand why it should have been considered a check upon the impetuous democracy, though it would, perhaps, be fairer to regard it as a check upon both extremes. It is not known how many members were included in its council. The nine archons—if they had recommended themselves by a faithful discharge of their duties—were elected life members of it. Solon made the council 'overseers of everything,' and we find instances of their manifold authority in the subsequent history of Greece. They granted money, at the time of the Persian invasion, from a reserve treasury of their own, the ordinary public treasury being empty. After the battle of Chæronea, they put to death all who had deserted their country. In social matters, their powers appear to have been curiously minute. They had officers whom they sent or accompanied into private houses, on occasion of a festivity, to see that the rooms were not overcrowded; they

called to account persons who lived in such riotous extravagance that their example might be considered hurtful to the community, and conferred marks of honor on those of an opposite character. Their sphere of influence seems to have extended to religion also. Innovations in the worship of the gods, neglect of the sacred ceremonies, impiety in any form, brought the offenders under the rebuke and punishment of the A. It is likewise asserted that they possessed and exercised great authority in the education of the young, although this statement, and that regarding some charitable functions attributed to them, are of dubious value.

Until the time of Pericles, the brilliant and powerful ruler of the democracy, the A. maintained its ancient dignity. He soon discovered, however, that unless shorn of its privileges it would prove an insurmountable obstacle to the realization of his designs. Against much vigorous opposition, he succeeded in carrying a decree (B.C. 458) by which, as Aristotle says, the A. was 'mutilated,' and democratic tribunals acquired supreme authority. It is, however, far from being clear what were the precise changes which Pericles effected, whether he abridged its powers as a criminal, or as a social and political court. From the high estimation in which it was held for centuries after, in the first of these capacities, we are inclined to think that it was its social and political supremacy that was destroyed. Probably the A. was made responsible to the *demos*, or body of citizens. It lingered in life for a very long period. It is heard of as late as A.D. 380, and it seems from the case of the apostle Paul (Acts xvii. 19, 22), that it had in his day a certain authority in religious matters.

AREQUIPA, *â-rā-kē′pâ:* term applied primarily to a mountain in the w. Cordillerâ of the Peruvian Andes, and secondarily to a city at its foot, being from this again extended to a district, a province, a department, and a diocese. 1. The city, lat. 16° 13′ s., long. 72° 18′ w., is the third largest in Peru, inferior only to Lima and Cuzco. It has considerable trade both with the interior and by sea. It has a port at both Islay and Mollendo. Pop. of A. est. 35,000.—2. The department is bounded n. by Lima; e. by Ayacucho, Cuzco, and Puno; s. by Moquega, which, with it, forms the diocese; and w. by the Pacific. It is subdivided into seven provinces. Like nearly the whole of the maritime region of Peru, it is generally arid and sterile. Pop. 229,007.—3. The mountain is volcanic, of the form of a truncated cone, and of the height of 20,000 feet. Its neighborhood is subject to earthquakes.

ARES: see MARS.

ARETÆUS, *ăr′ē-tē′ŭs:* a famous physician of Cappadocia, who lived in the latter half of the 1st, and in the beginning of the 2d century after Christ. He is considered to rank next to Hippocrates in the skill with which he treated diseases; but he did not, in every instance, follow

the practice of the 'Father of Medicine'. He was less attentive to 'the natural actions' of the system, which he frequently counteracted, if he thought desirable: administered active purgatives copiously, employed narcotics, and did not object to bleeding. He was noted for total want of professional bigotry; hence not committing himself to any particular set of opinions, in his accuracy in the detail of symptoms and the diagnosis of disease he is superior to most of the ancient physicians. His great work, written in singularly elegant and concise Ionic Greek, is divided into two parts. The first four books treat of the causes and symptoms of acute and chronic diseases, the second, the cure of the same. They are in a state of almost complete preservation, and have been translated into various European languages, besides having been frequently edited in the original.

ARETHU'SA: see ALPHEIUS.: ORCHIDACEÆ.

ARETI'NIAN SYLLABLES: the syllables *ut, re, mi, fa, sol, la,* used in music by Guido d'Arezzo for his system of hexachords.

ARETINO, GUIDO: see GUIDO ARETINO.

ARETINO, *â-rā-tē'no:*, PIE'TRO, Italian author: 1492, Mar. 20—1556; b. Arezzo, Tuscany; natural son of a gentleman named Luigi Bacci. Banished from his native town, he went to Perugia, where he wrought as a bookbinder, and gathered up a few scraps of learning, until, seized with a desire of becoming famous, he abandoned his occupation, and wandered through Italy in the service of various noblemen. At Rome, he distinguished himself by his wit, impudence, and talents, and secured even the papal patronage, which, however, he subsequently lost by writing licentious sonnets. A. now went to the Medicean court, where John de Medici grew so fond of him that he shared his bed with the adventurer, and even procured him an opportunity of ingratiating himself with Francis I. at Milan in 1524. A few years later, he settled at Venice, where also he acquired powerful friends. The Bishop of Vicenza not only soothed the irritation of the pope against A., but also recommended him to the emperor Charles V. The latter, as well as his chivalrous rival, Francis, and other great persons, pensioned the fortunate wit, besides enriching him with splendid presents. He likewise obtained considerable sums for his literary efforts.

Nature had undoubtedly gifted A. with some fine qualities, but these were vitiated by his love of sensual gratifications. His death accorded with the character of his life. It is said that while laughing heartily at some trifling adventure of one of his abandoned sisters, he fell from a stool, and was killed on the spot. His poetical works include five comedies and a tragedy. The former are full of wit and geniune comic humor; the latter is not without merit. His *Sonnetti Lussuriosi* have been translated into French under the title of *Académie des Dames.* Besides these, he wrote a number of other pieces, some of which have not been published. His satire procured for him

the name of 'the Scourge of Princes,' but it seems clear that he was equally fitted to be their sycophant. Although the very impersonation of licentiousness, he had nevertheless the impudence to publish some books of a devotional kind, with the view of obtaining the favor of the pope.

ARETI'NO, Spinello: 1316 (or 1328)–1408; b. Arezzo, Tuscany: early Italian painter of great genius. He studied under Jacopo del Casentino; but before he had attained his majority, he had surpassed his master in the vigor and liveliness both of his conceptions and coloring. His reputation attained its full bloom after he went to Florence, where he painted in fresco, in the chapel of St. Maria Maggiore, several incidents in the life of the Virgin, and of San Antonio Abate. The monastery of San Miniato, near Florence, contains to the present day a few of his frescoes. He also adorned the monasteries of San Bernardo at Arezzo, and Monte Oliveto near Florence. Vasari thought that the finest works of A. were those which he executed for the Campo Santo at Pisa, illustrating the life of San Ranieri. Of these, however, we have only prints, and cannot therefore judge satisfactorily. His principal works, still remaining, are those from the life of Pope Alexander III. in the town hall of Siena.

Throughout all Italy, A. was greatly admired for his invention, the grace and simplicity with which he arranged his figures, and the finish of his style. His Madonnas had remarkable sweetness of expression; and his coloring was in most cases bold and beautiful. Vasari prefers him to Giotto.

AREZZO, *â-rĕt'so* (Aretium): chief city of the Italian province of A.; in a fertile valley near the confluence of the Chiana with the Arno, lat. 43° 27′ n., long. 11° 52′ e.; 38 m. e.s.e. from Florence. A. is perhaps the oldest town in Tuscany, and was one of the twelve cities of the ancient Etruscans. It was devastated by Sylla during the Social War; and, like many other Italian cities, was sacked by the Goths when they burst into the peninsula. During the contest of the Guelphs and Ghibellines, in a later age, it became a subject to Florence, whose troops defeated those of A. at the battle of Camaldino, in which the poet Dante took part. The *Piazza Grande*, the *Pieve*, an old church founded on the site of a heathen temple, and the cathedral, which, like almost all the other churches, has an unfinished facade, are its principal public buildings. The cathedral has a splendid high altar in marble by Giovanni Pisano; and the several churches contain fine specimens of the old Tuscan school of painting. Its chief manufactures are silks and woolen cloth. A. no longer holds the commanding position in Italian life which it had in ancient and mediæval times; many celebrated men were born here. Mæcenas, the famous patron of letters in the time of the emperor Augustus; Petrarch; Pietro Aretino; Guido de A., inventor of the gamut; Leonardo de A., the historian; Cesalpino, the botanist; Redi, the physician; Pope Julius III.; the notorious Marshal d'Ancre; and

Vasari, author of *Lives of the Painters*. Michael Angelo was also born in the vicinity of A. Its extensive walls and numerous churches bear record of its flourishing and more populous period. Pop. (1901) 44,316. The province of A. contains 1,273 sq. m.; is fertile in corn, wine, and oil; pop. (1901) 271,676.

ARFVEDSONITE, *ar'ved-son-īt:* a mineral of the amphibole group, crystallizing in the monoclinic system. Chemically, it is a silicate of sodium, aluminum, and ferrous iron. Its hardness is 6 and its specific gravity 3.44. It is black and opaque with a vitreous lustre, and exhibits marked pleochroism. It occurs in Norway and Greenland and was named for the Swedish chemist, J. E. Arfvedson.

ARGAL, n. *ăr'găl,* or AR'GOL, n. [said to be from Arabic: Gr. *argos,* white]: crude tartar, or impure cream of tartar. It is found as a crust in old wine casks. See ARGOL.

ARGAL, ad. *âr'găl* [a corruption of L. *ergo*]: in *OE.,* slang for *ergo,* therefore.

AR'GALA: see ADJUTANT.

ARGALI, n. plu. *âr'gă-lī* [native name]: the *Ovis ammon,* or gigantic wild sheep of Siberia and Central Asia. It is found from Kamtchatka to the Himalaya Mountains, where, however, it is seen in only the more elevated regions. They are very long-legged, stand as high as a calf, and have immense horns; the horns of the male are nearly 4 ft. long, and 14 in. in circumference at the base, where they are triangular. The general color is fulvous gray, white beneath, with a whitish disk around the tail. The wool is concealed by hair. The name A. is Mongolian, and was adopted by Pallas. A similar but smaller species also is found on the Himalaya Mountains. The Rocky Mountain Sheep, or Bighorn, is sometimes called the American A. See SHEEP.

ARGALL, *ăr'găl,* SIR SAMUEL, seaman and American colonial official: b. Walthamstow, Essex, England; d. 1626, Jan. 24. In 1609, May, he was sent with a small barque to the new settlement at Jamestown, Va., to trade and fish on behoof of the owner. The next year he took out Lord Delawarr to Jamestown, arriving just in time to prevent the entire colony, with the governor, Sir Thomas Dale, leaving for Newfoundland to avoid starvation. He was sent to the Bermudas for swine to replace those the colonists had eaten up, but was driven by storms to Cape Cod, where he found good fishing and returned in August; established a corn trade with the Indians above Jamestown, and early in 1611 returned to England with Delawarr, whose health was bad. In 1621, September, he was again at Jamestown after the then swift passage of 51 days, and the rest of the year he and Dale spent in corn-hunting among the Indians. Powhatan had a number of English prisoners in his hands, and a quantity of weapons and implements; and Argall, hearing that the chieftain's daughter Pocahontas was with her uncle

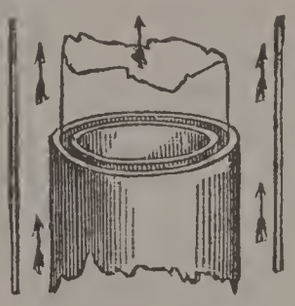
'Powtownec' (Potomac), had the happy thought of securing her to exchange against them, a feat accomplished by threats and the offer of a copper kettle to her uncle. The stock denunciation of him for this 'nefarious treachery' is best answered by the fact that no one was harmed, all parties were benefited, and a most desirable aim was achieved. Pocahontas herself considered it a piece of rare good fortune, would not leave the whites, and soon after married one of them, while the prisoners were released, and peace restored to the colony. Argall handed her over to Sir Thomas Gates. Argall explored the east shore of Chesapeake Bay, fishing and trading, and later in the year was sent with a vessel of 14 guns to destroy the French settlements on the north coast, regarded as infringing on the Virginia patent. He captured Mount Desert, St. Croix, and Fort Royal (N. S.), carried off the settlers as prisoners to Jamestown, and on the way forced the commandant at New Amsterdam to recognize English suzerainty by hauling down the Dutch flag and running up the English. In 1614 he sailed for England, and was put on his defense for these high-handed acts, but completely justified himself. In May, 1617, he was made deputy-governor of Virginia, and remained two years in a broil with part of the citizens, but justified by others. He was accused of illegal trade with the West Indies, and repeatedly ordered to return to England for trial, a command which he ignored for a time, possibly in reliance on the Earl of Warwick, who financed and shared his ventures. In 1620 he served against the Algerine pirates with a 24-gun merchant vessel, under Sir Robert Mansell. He was knighted in 1622. In 1625 he was admiral of a squadron cruising after a hostile Dunkirk fleet, and took some prizes. On October 3 of that year he embarked with the squadron in the expedition against Cadiz under Lord Wimbledon, with Lord Essex on board as vice-admiral and commander of land forces; Argall's flagship was the Swiftsure. He reported the fortress too strong to be taken without a siege, the merchant vessels were ill supplied and unpaid, and after waiting till December for relief from Charles I. they went home. Argall died the next month, it was said from a broken heart because the captain of the Swiftsure was very backward and cross to him. (Argall's own narrative comes down to 1613, May 12.

ARGAN, (*Argania sideroxylon, Sideroxylon spinosum* of Linnæus): a low spiny evergreen tree of the natural order *Sapotaceæ,* native of the southern parts of the kingdom of Morocco, bearing an ovate drupe about the size of a plum, dotted with white and full of a white milky juice. The Moors extract an oil from the fruit, which they use with their food.

ARGAND *âr'gănd,* or *âr-gŏn',* Aime: b. Geneva, abt. the middle of the 18th c.; d. 1803, Oct. 24: physician and chemist. He was the inventor of the well-known *Argand lamp* (q.v.); and early becoming involved in a dispute with

one Langé of Paris regarding the originality of his invention, he went thither to vindicate his claim, but rather than risk the chances of a lawsuit he consented to share the honor, and a patent was obtained by which Langé and A. alone were authorized to make and sell the new lamps in France for 15 years. The French Revolution, however, destroyed their privilege, and A. retired to England. After some time, he returned to his native country, a victim to melancholy and fantastic humors, and died.

ARGAND LAMP, or ARGAND BURNER: a form of wick, or gas-burner, giving a circular flame. The chief difficulties that attended the use of lamps as a source of light were—first, in procuring the complete combustion of the oil, so as to keep the flame from smoking; and second, in preventing the level of the oil in the reservoir from sinking as the combustion goes on. The round cotton-wick, used in the old simple form of lamp, was always attended with smoke and smell. The oils and fats are exceedingly rich in carbon, containing 70 to 80 per cent. of that element, and only 10 to 12 of hydrogen. The round, thick column, then, of oil-vapor rising from the wick of an old-fashioned lamp, presented too little extent of surface to the air; the oxygen of all the air that could get access was chiefly taken up in burning the hydrogen, and a large proportion of the carbon ascended in the burnt air as smoke. A.'s improvement was that he made the wick in the form of a ring. The flame thus became a hollow cylinder with a current of air ascending through the inside, so that the burning surface was doubled. It would appear, however, that the lamp did not satisfy the expectations of A., till his younger brother accidentally discovered the effect of a glass cylinder, as a chimney over the flame, by which the flame was steadied, a draught created, and the greatest possible amount of light yielded. The principle of the Argand Burner for gas is the same—increased combustion by means of an ascending column of air within.



Argand Burner.

ARGAUN': village in the territory of the Nizam; in lat. 21° 2′ n., long. 77° 2′ e.; on the route between Ellichpore and Aurungabad. Its single claim to notice is that, 1803, Nov. 28, about two months after the battle of Assaye, Maj.Gen. Wellesley here gained another victory over the Mahrattas. To commemorate this action, a medal was struck in 1851, about a year before the death of the illustrious conqueror.

ARGEAN, a. *ar-jē'an* [from *Argo*, the ship which carried Jason and his companions to Colchis in quest of the golden fleece]: pertaining to the Argo or the ark.

ARGEL or ARGHEL, *ar'gel* (*Solenostemma A.*, or *Cynanchum A.*): plant of the natural order *Asclepiadaceæ*, native of Arabia and of the north of Africa, deserving notice only because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery, and may read-

fly be distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna leaves being unequal. They are acrid, and cause sickness and griping, but opinions differ as to their possessing purgative properties.

ARGELANDER, *ȧr'gĕh-lăn-dĕr*, Friedrich Wilhelm August: 1799, March 22–1875; b. Memel, Prussia: one of the most eminent astronomers of our time. He studied at Königsberg, where the science of finance first attracted him; but he was subsequently drawn to astronomy by the lectures of Bessel, by whom he was employed to make calculations and observations. In 1820, he was appointed assistant to Bessel in the Königsberg Observatory, and in 1823 succeeded Wahlbeck as astronomer at the observatory of Abo, in Finland. Here he commenced a series of observations on the fixed stars which have a perceptible 'proper motion.' His studies were unfortunately interrupted by a fire which destroyed the observatory; but after a time he resumed them in a new observatory at Helsingfors, and published a catalogue of not less than 560 stars having 'proper motions.' This contained the results of his observations at Abo, and received from the Academy of St. Petersburg the great Demidov prize. After removing to the University of Bonn in 1837, A. published his *Uranometria Nova* (Berlin, 1843), containing celestial charts of the fixed stars in our hemisphere seen with the naked eye; also (1846) his *Astronomical Observations*, containing the results of an examination of the northern heavens from 45° to 80° declination. His *Atlas of the Heavens* will combine with these works to perpetuate his memory. *L.* was long engaged in a series of observations on the changes of light in variable stars; he also demonstrated the theory that there is a progressive motion of the solar system in space.

ARGEMONE, *ȧr-jē-mō'nē:* genus of plants of the natural order *Papaveraceæ*, distinguished by 4–6 petals, 4–7 radiating concave stigmas, and an obovate capsule, opening by valves at the point. *A. Mexicana*, sometimes called Mexican poppy, is an annual herbaceous plant with large yellow flowers, and sessile, waved and sinuated, spiny leaves, variegated with white. It is a native of Mexico, introduced in southern parts of the United States, and is now common also in many tropical and sub-tropical countries, in which it has been naturalized. Its seeds are narcotic, purgative, and diuretic, exhibiting in a strong degree those qualities of the order of which the seeds of the poppy are devoid. They are used in the West Indies as a substitute for ipecacuanha, also instead of opium; and the juice of the plant is employed as a remedy for ophthalmia.

ARGENS, *ȧr-zhŏn'*, Jean Baptiste de Boyer, Marquis d': 1704, June 24—1771, Jan 11; b. Aix, in Provence. He was originally intended for a learned career; but, from a love of adventure, he entered the army at fifteen. Fascinated by a certain actress, he eloped with her to Spain, but was captured and brought back to Provence. In spite of his glaring breach of discipline, he had the good fortune to be em-

ployed in the French embassy to Constantinople, and on his return re-entered the army. Being disabled by accidents in military service, and disinherited by his father, he tried his fortune in authorship, and by his *Lettres Juives, Lettres Chinoises, Lettres Cabalistiques*, and *La Philosophie du Bon Sens* (London, 1737), attracted the notice of Frederick II., then crown prince of Prussia, and became a favorite at the court when Frederick came to the throne. The king appointed him chamberlain, and a director of the Art Academy at Berlin, with a salary of 6,000 livres. He was a constant associate of Frederick, who liked exceedingly his frank and vivacious character, but used to tease him on account of his hypochondriacal fits. When almost a sexagenarian, he renewed the adventures of his youth by again falling a victim to the charms of an actress, Mademoiselle Cochois, whom he married without Frederick's permission. This and other circumstances irritated the despotic monarch, who deprived A. of his pension; and A. returned to Provence, and died at Toulon. His numerous writings, but especially his *Histoire de l'Esprit Humain, Lettres et Mémoires*, and those above mentioned, once had considerable reputation.

ARGENSOLA, *âr-hĕn-so'lâ*, Lupercio and Bartolomé Leonardo de: two of the first among the Spanish poets in the 'golden age,' were born at Barbastro, in Aragon; the former, 1565; the latter, 1566. They died, the former, 1613; the latter, 1631, Feb. 26. They studied at the University of Huesca. Lupercio afterwards went to Madrid, while Bartolomé entered the priesthood. In character, fortune, and career, however, they were closely united. Both were patronized by Maria of Austria, who appointed one her chaplain, and the other her private secretary. The latter was subsequently made chamberlain to the archduke Albert of Austria, and Philip III. appointed him historiographer of Aragon. Bartolomé was employed by the Count de Lemos to edit the *Conquista de las Molucas* (Madrid, 1609), and when this nobleman was appointed viceroy of Naples, both the brothers A., who had acquired fame as poets, attended his court at Naples, where Lupercio, who then filled the office of secretary of state, died. Bartolomé returned to Spain with the viceroy in 1616, and occupied the position formerly held by his brother as historiographer of the kingdom of Aragon, where he proceeded with the work left unfinished by Lupercio—a continuation of Zurita's *Annals of Aragon*. While engaged in this work he died. The collected poems of the two brothers were first pub., 1634, by the son of Lupercio, and passed through several editions. These poems (*Rimas*) consist of epistles, odes, sonnets, and satires, and are singularly alike in character. They are imitative of the style of the Latin poets (especially Horace, for which reason the brothers have been styled 'the Spanish Horaces'), and display more care and polish than originality of invention or richnesss of fancy. Bartolomé A. as a prose-writer is reckoned among the Spanish classics. The style of his continuation of Zurita is a great advance on the original; especially in correctness.

ARGENSON, *âr-zhŏn-sōn'*, Marc Pierre, Comte d';

ARGENTINE REPUBLIC, CHILE, PARAGUAY. AND URUGUAY.
SCALE OF STATUTE MILES.
0 50 100 200 300
Copyright, 1904, by Rand, McNally & Co.
R., MC N. & CO. ENGR'S CHI.
Longitude West from 65° Greenwich.
70°
65°
60°
55°
75°
20°
25°
30°
35°
40°
BOLIVIA
PARAGUAY
ARGENTINE REPUBLIC
URUGUAY
CHILE
BRAZIL
PACIFIC OCEAN
ATLANTIC OCEAN
GRAN CHACO
PAMPAS
TROPIC OF CAPRICORN
SUCRE OR CHUQUISACA
ASUNCION
(70°)
BUENOS AIRES
(74°)
MONTEVIDEO
(67°)
VALPARAISO
SANTIAGO
(60°)
RIO DE LA PLATA
MARSH OF XARAYES
SALINAS
GREAT SALT MARSHES
SERRA AMAMBIHY
SERRA GERAL
LAKE DOS PATOS
Tacna
Arica
Pisagua
Tarapaca
Iquique
Cobija
Mejillonos Bay
Antofagasta
Point Grande
Taltal
Chancral
Caldera
Copiapo
Vallenar
Coquimbo or La Serena
Ovalle
Illapel
Quillota
Rancagua
S. Fernando
Curico
Constitucion
Taloa
Linares
Cauquenes
Concepcion
Chillan
Antuco Vol.
Arauco
Lebu
Los Angeles
Angol
Mocha I.
VILLA RICA VOL.
Valdivia
Ranco Lake
Osorno
Llanquihue Lake
Port Montt
San Carlos
Chiloe Island
Castro
Minchinmadiva Vol.
8,000 feet
Chubut
Oruro
Aullagas Lake
Potosi
Mizque
Rio Grande
Vallegrande
S. Jose
Pomabamba
Camargo
Tupiza
Tarija
Ascotan
Pilcomayo
Oliden
Fuerte Olimpo
Miranda
Concepcion
San Pedro
Villa Rica
Paraguari
Apa River
Taquary
GRANDE I.
Cataract of Guayra
Villa Formosa
Pillar
Humaita
S. Maria
Yguazu R.
Tartagal River
Iruya
Oran
Incaguasi Mt.
Santa Barbara
Jujuy
Salta
Teneo
Livadavia
Bermejo R.
Miraflores
Santa Maria
Tucuman
Catamarca
Tinogasta
Santiago
Salado River
Vinchina
Rioja
Jachal R.
Catuna
Chepe
San Juan
Aconcagua Vol.
23,910 ft.
Tupungato Peak
San Luis
Lake Bebedero
San Rafael
Atuel R.
Ft. St. Martin
Quinto R.
Cuarto R.
Rio Cuarto
Villa Nueva
Cordova
L. Chiquita
L. Porongos
Soledad
Santa Fe
Rosario
Corrientes
Lake Malaya
San Xavier
Candelaria
Ibera Lake
Mercedes
Parana
Goya
La Paz
Concordia
Parana
Uruguay
Victoria
Pergamino
Salado
Lincoln
Bragado
R. La Plata
Trenel
Paz
Trenque Lauquen
Azul
Dolores
Tandil
Juarez
Mar del Plata
Cape Corrientes
Bay of Samborombon
Cape S. Antonio
Fort Cuarta Division
Poilague
Quentinal Curahue
Chillan Vol.
9,446 ft.
Colorado
Chadileufu R.
Gen. Acha
Urre Lauquen (Bitter Lake)
Bahia Blanca
Blanca Bay
Negro River
Limay R.
Valchitas
Colpe Salina
Lake Nahuel-Huapi
Lake Ichueguin
Puelo Lake
Anegada Bay
Carmen
BAY OF SAN MATIAS
SAN JOSE PENINSULA
Nuevo Gulf
S. Rosa
Salto
Paysandu
S. Fructuoso
Villa de Cerro Largo
Negro R.
Soriano
Durazno
Florida
Colonia
S. Jose
Rocha
Maldonado
Cape S. Maria
Bage
Pelotas
Rio Grande do Sul
Merim Lake
Camacuan R.
Rio Pardo
Uruguay River
Parana River

1696–1764: celebrated French statesman. He succeeded M. de Breteuil as secretary of state to the war minister 1742. On the death of Cardinal Fleury, in the following year, the whole care of the war then raging devolved on him. He found affairs in a deplorable condition. The French troops were in full retreat across the Rhine; the Austrians already swarmed in Alsace and Lorraine, and the very political existence of France was imperilled; but A., by his vigor and lucky choice of generals, changed in one year the fortunes of the war. After the victories of Fontenoy and Lawfeldt, and the capture of Bergen-op-Zoom peace was secured by the famous treaty of Aix-la-Chapelle, signed 1748. He was an illustrious patron of literature.

ARGENT, n. *âr'jĕnt* [F *argent*, silver—from L. *argen'tum*, silver: *ârgĕn'tĕŭs*, of the lustre of silver]: the white color in coats of arms: ADJ. silvery: bright. ARGENTINE, a. *âr'jĕn-tĭn*, like silver: N. a mineral. ARGENTAL, a. *âr'-jĕn'tăl*, or ARGENTIC, a. *âr-jĕn'tĭk*, of or like silver. ARGENTAN, n. *âr'jĕn'tăn*, German silver. ARGENTATION, n., *âr'jĕn-tā'shŭn*, an overlaying with silver. ARGENTIFEROUS, a. *âr'jĕn-tĭf'ĕr-ŭs* [L. *fero*, I carry]: containing silver. ARGENTITE, n. *âr'jĕn-tīt'*, a sulphuret of silver, the most important and richest ore of silver, of a blackish lead-gray color.

ARGENTEUIL, *âr-zhŏn-tŭĭl':* town of France, dept. of Seine et Oise. Its priory, now in ruins, was founded in the 7th c., and was by Charlemagne made a nunnery, of which the famous Heloise became abbess. Pop. 15,126.

ARGEN'TEUS CODEX: see ULFILAS.

ARGENTINE, *âr'jĕn-tīn* (*Argentina*): genus of small fishes of family *Salmonidæ* for the resplendent silvery lustre of their sides, and the abundance of *nacre* (q.v.) on their air bladder. A. denotes also a silvery siliceous carbonate of lime: also white metal coated with silver.

ARGENTINE, *âr'jĕn-tīn:* city in Wyandotte co., Kan., near the Kansas river; and on the Atchison Topeka and Santa Fé railroad, 5 m. from Kansas City, Mo. It is in an open farming country; has a state bank, and a weekly newspaper; and a number of furniture and other industries, including a large smelting and refining establishment. A. has electric light and water works. Pop. about 5,000.

ARGENTINE REPUBLIC: federal republic of S. America, taking its name from the river La Plata ('river of silver,' a misnomer): (see PLATA, RIO DE LA); lat. 22° 30′—56° s., long. at the widest part 54°—70° 31′ w.; 1,125,086 sq. m.; bounded w. by the Andes, which separate the A. from Chile; n. by Bolivia; e. by Paraguay, Brazil, Uruguay, and the Atlantic: southward it extends to Cape Horn. Capital, Buenos Ayres. The islands of Fuegia, on the s., belong partly to it and partly to Chile. The area by the census of 1900, Dec. 31, was 1,135,840 sq. m., and the population 4,794,149.

ARGENTINE REPUBLIC.

Except the most purely Indian districts to the w. of Buenos Ayres, the provinces of the A. R. lie chiefly in the basin of the Rio de La Plata, embracing much the larger half of the same. Mountains abound in the n.w.; and elevated ranges are found also in Entre Rios, which is situated, as its name implies, between the Parana and the Uruguay. But, with these exceptions, nearly the whole country presents boundless plains, covered alternately with rich pasturage and gigantic thistles. The climate and productions vary considerably—being tropical and temperate respectively to the n. and s. of Corrientes (in 27°27′ n. lat.). The chief agricultural products are wheat, maize, flax, and linseed. The constitution of Argentina provided that 'The federal government shall encourage European immigration, and shall not restrict . . . the entry . . . of foreigners who come for the purpose of engaging in the cultivation of the soil,' etc. Immigrants have been attracted by a liberal policy which both the federal and provincial governments adopted: the former, in addition to free grants of land, has advanced capital (oxen, tools, etc., to the value of $1,000 for each farmer) to be paid back in five years. There were 125,951 immigrants in 1901, and the area of lands under cultivation shows such an increase as might be expected—17,174,250 acres in 1902 as against only 7,478,700 acres in 1880. The rearing of live-stock is, however, the most important business of the country. Millions of cattle wander at will across the plains, or are kept on breeding-estates of vast extent; and likewise of mules and horses there are immense bands. Besides the Rio de la Plata, which is rather an estuary than a river, and its far-reaching affluents, the hydrography of the A. R. comprises the headwaters of some southern streams, which fall into the open Atlantic, such as the Rio Colorado, the Rio Negro, etc.; and along the w. border under the shadow, as it were of the Andes, salt-lakes are common. In connection, doubtless, with this feature, in the hydrography, mines of rock-salt exist, and salt here and there abundantly encrusts the plains, both to the satisfaction and to the benefit of the roaming herds. The names of the country and its estuary are, as already characterized, to a great extent misnomers, yet silver ore, gold, copper, sulphur, coal, and alum have been found near the Andes.

In 1904 the imports were $180,750,000 and exports, $254,912,000, of which $20,702,413 and $10,750,862 respectively was with the United States. The chief exports are wool, skins, and hides, live animals, wheat, Indian corn, and flax, and the imports are chiefly manufactured articles.

There were in the A. R. (1904) 12,000 m. of railway and 312 m. of tramway (all in Buenos Ayres). Over 1,500 m. of new railroad lines were in process of construction in 1905. There were 30,000 m. of telegraph lines at the end of 1904.

The state religion is Rom. Cath., but all creeds are

CITY HALL, LA PLATA.

tolerated. Primary education is compulsory and gratuitous for boys and girls between the ages of 6 and 14 years. There is one school for each 1,000 inhabitants. Primary education is under the direction of a national board of education with full control of all public schools. Cordoba and Buenos Ayres have universities. Military and naval academies, a national observatory, trade schools, and an academy of mining engineers, have already been established, and it is the government's purpose to add to these practical schools for the instruction of laborers in rural industries and forestry near the capital or principal city of each province. There are more than 200 public libraries in the country, the government adding an equal sum to any endowment by private gift. Under the judicial system each province has its own courts, and there is a national supreme court of five judges and an atty.-gen., who also constitute a court of appeals. In all criminal cases the constitution guarantees trial by jury. The executive authority is vested in a pres., elected for 6 years and ineligible for re-election; the legislative in a senate of 30 members and a house of deputies of 120 members; and the provincial in govs. and legislatures elected by the people. The army consists of about 7,400 men, besides the national guard of 350,000. The navy consists of 41 vessels including 7 modern armored ships and 12 first-class torpedo boats.

History.—In 1515, Juan Diaz da Solis, while searching for a passage into the Great South Sea newly seen by Balboa, entered the Rio de La Plata. In 1526, Sebastian Cabot, son of the discoverer of Newfoundland, penetrated nearly to the confluence of the Parana and the Paraguay, being arrested by the rapids, which afterwards gave name to Corrientes. In 1535, Buenos Ayres was founded, to command, though indirectly, the most practical channel of the only outlet of the country, a city which, in conjunction with its own colony of Monte Video, on the opposite bank, has virtually monopolized the history of a region equal in extent to w. Europe. Gradually other cities were planted, partly by colonists from Spain, partly by adventurers from Peru. The chief staples of the country—horses and cattle—had been largely introduced before 1552. Until 1775, the basin of the Rio de La Plata was a dependency of the viceroyalty of Lima. In that year, however, was erected the viceroyalty of Buenos Ayres, which added Bolivia, under the name of upper Peru, thus embracing the head-waters of the Amazon, and most of the plateau of Titicaca. The year 1806 ushered in a change. Spain, as ally of France, being then at war with England, Buenos Ayres and Monte Video were occupied by the English—a change which though brief, sowed the seeds of revolution by showing the colonists the weakness of their former masters, and moving them to assert their independence. The triumphant militia, after deposing and expelling the legitimate viceroy for cowardice, elected in his stead the French officer

who had led them to victory. Napoleon's dethronement of the Bourbons, 1808, occasioned an outbreak throughout Spanish America, and from 1810 the A. R. was in confusion. In 1816, a general congress declared the independence of the 'United Provinces of Rio de La Plata'; but those provinces, 1827, returned to a state of isolation. In 1831, Buenos Ayres, Entre Rios, Corrientes, and Santa Fé, sometimes classed as the coast or riverine states, entered into a federal compact, and invited the others to form a voluntary alliance. This Argentine Confederation led to little but anarchy till 1835, when Gen. Rosas was elected capt.gen. or gov. of it, with almost absolute power. He secured order for a time; but his personal ambition, and his policy to make Buenos Ayres supreme, led to his ultimate overthrow 1851. Buenos Ayres refusing to submit to Urquiza, the next gov. of the A. R., declared itself independent 1854, but was compelled by a signal defeat at Cepeda 1859 to re-enter the confederation. Another war, in which its army was ably led by Gen. Mitre, placed that province in its present position of supremacy. In 1865, the A. R. became involved with Brazil and Uruguay in a war against Paraguay, which ended 1870, having accomplished little in the interest or to the credit of A. R. A revolution broke out in Buenos Ayres 1890, July, which resulted in the resignation of Pres. Celman, and the succession of the vice-pres., Carlos Pelligrini. A financial panic prevailed through the summer and nearly bankrupted the Baring Bros. of London, fiscal agents of the A. R. Luis Saenz-Peña was elected pres. 1892, Apr., and Dr. Uriburu vice-pres. A state of siege had existed during the elections and the week preceeding, and many prominent citizens, including the radical candidate for the presidency, Dr. Yrigoyen, were arrested. The govt. professed to have conclusive evidence against the arrested radicals of intended murder and the use of dynamite. The state of siege lasted until after the meeting of the electors in the provincial capitals June 2. The successful candidate, Dr. Luis Saenz-Peña, was supported by the two principal political parties. During the same year a scheme for colonizing Russian Jews in the A. R., patronized by Baron Hirsch of Paris, ended in utter failure after more than 200 Jewish families had settled on the lands apportioned for their use. The land selected for the colony was ill-chosen, and the people were not of the kind to establish pioneer settlements in a new country.

ARGENTUM, n. *ȧr-jĕn'tŭm* [L.]: silver (q.v.); chem. abbreviation. Ag.

AR'GES: genus of small fishes, of the family *Siluridæ*, of extreme interest on account of their being frequently thrown out in vast numbers by some of the S. American volcanoes, with torrents of muddy water. Humboldt was the first accurately to inquire into this wonderful fact, and to describe one of these fishes, which he referred to the genus *Pimelodes*, and called *P. cyclopum*. It is now called *A. cyclopum*. The quantities of these fishes ejected from the volcanoes in the neighborhood of Quito are sometimes

so great, that the stench of their putrefaction is felt at a great distance, and putrid fevers are caused by it. They are expelled from craters or from lateral openings at an elevation of 16,000 or 17,000 ft. above the sea. It is supposed that they exist in lakes within the cavernous recesses of the mountains, but nothing is positively known on this subject. Their capacity of enduring the high temperature of the water with which they are ejected has excited much interest. Several species are known, to which the common name of *preñadillas* is given in the country, and which are placed by ichthyologists in the genus *A.*, and the closely allied genera *Brontes* and *Astroblepus.*

ARGIL, n. *âr'jĭl* [L. *argil'la,* white clay: F. *argile*]: pure clay; potter's clay. ARGILLACEOUS, a. *âr'jĭl-lā'shŭs* [L. *argillā'cĕŭs,* clayey]: consisting of clay or argil; clayey. AR'GILLIF'EROUS, a. *-lĭf'ĕr-ŭs* [L. *fero,* I produce]: producing clay, or abounding in clay. ARGILLITE, n. *âr'jĭl-līt,* a term applied to clay-slate. Argil is a term now little used, but the derivative *argillaceous* is still in frequent use as descriptive of soils, geological deposits, etc., and in the name *Argillaceous Slate* or *Argillaceous Schist,* instead of which, however, the name *Clay-slate* (q.v.) is more generally employed. The term *argillaceous* is rather vague, and sometimes *clayey,* sometimes *aluminous,* would seem to be its equivalent. See ARGILLACEOUS ROCKS.

ARGILE PLASTIQUE, *âr-jĭl plăs-tĭk:* a series of beds at the base of the Tertiary system in France, resting on a conglomerate or breccia of rolled and angular chalk-flints. They consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. Marls occur, inclosing, in some places, the fluviatile shells that are met with in the same position in the London basin, and in other places large numbers of a species of oyster. Beds of impure lignite also occur. The A. P. is the equivalent in the Paris basin of the Woolwich and Reading series, or Lower Eocene of the English geologists. See EOCENE.

ARGILLA'CEOUS ROCKS, *âr'jĭl-lā'shŭs:* all rocks composed entirely or to some extent of clay. Pure clay is known as *kaolin* or *porcelain clay.* It is a hydrated silicate of alumina. Decomposed feldspar, from which the silicates of potash, soda, etc., have been washed out, supplies the material which forms kaolin. *Common clay,* however, contains many impurities; the chief are sand, in variable proportions, and oxide of iron, which gives its color to the mass. Any matter that contains sufficient alumina (more than 10 per cent.) to enable it to retain its shape when molded and pressed, is called clay. Plastic clays occur abundantly in the superficial deposits in the Tertiary strata. The older clays become more or less indurated. When they are regularly laminated, and split into thin layers in the direction of the laminæ, they are called *shale.* In *clay-slate,* the clay has become highly indurated and metamorphosed, so as to split into plates that are altogether independent of the original lamination, and frequently cross it at right angles. Clay-

slate forms extensive deposits in the Azoic rocks, but it is not confined to these, for the Palæozoic shales are often converted into clay-slate, when, from their proximity to crystalline rocks, or other cause, they have been subjected to the action of heat.

A. R. can generally be distinguished by the peculiar 'argillaceous' odor which they give out when breathed upon.

ARGIVE, n. *âr'jīv* [*Argos*, in Greece]: a Greek; pl. ARGIVI. See ARGOLIS.

ARGOL, or ARGAL (q. v.): a crude variety of cream of tartar which forms a crust in the interior of wine-vats and wine bottles. Originally, it exists in the juice of the grape, and is soluble therein; but during the fermentation of the juice, and as it passes into wine, much alcohol is developed, which remaining in the fermenting liquor causes the precipitation of the A.; the latter being very sparingly soluble in an alcoholic liquid. Some wines, when they are bottled, are not fully ripe, and more alcohol being thereafter developed, a further precipitation of A. takes place as a crust in the bottles, and hence the meaning of the term *crusted port*. A. is generally of a reddish tinge, obtained from the color of the grapes, but sometimes is of a grayish-white color, when it has been deposited during the fermentation of the juice of colorless grapes. The *red* or *white* A. is denominated in commerce *crude tartar*, and its principal uses are in the preparation of cream of tartar (q. v.) and tartaric acid (q. v.). The constituents of A. are bitartrate of potash (cream of tartar), (KO, HO, $\overline{T}$), tartrate of lime, with coloring and extractive matters.

AR'GOLA: see ADJUTANT.

ARGOLIS, *âr'gō-lĭs:* the n. e. peninsula of the Morea (Greece), lying between the bays of Nauplia and Ægina, forming a nome, or department, in the modern kingdom of Greece. The plain of Argos, famous in ancient times for its breed of horses, is naturally fertile, but is now made pestilential by morasses. It is surrounded by an eastern continuation of the range of mountains on the n. of the Peloponnesus, which also girds the riven and shattered-looking coast. The highest summits attain an elevation of between 5,000 and 6,000 ft. The plain of A. is the most extensive in the whole peninsula, being 12 m. in length, and 5 in breadth. The e. part is higher and more rocky than the west. Near where the plain opens on the sea, the ground is marshy. This was the Lernean Marsh of antiquity. The nome of A. and Corinthia has now Nauplia as its capital, Pop. 158,000.

It was from the importance of the ancient kingdom of A. that the Greeks were collectively often styled Argivi by ancient writers. A. was colonized in very early times. According to the old traditions, Inachus, the Pelasgic chief, settled here B. C. 1800, and Danaus, B. C. 1500, with colonists from Egypt. Here Pelops ruled, and was succeeded by Atreus, Agamemnon, etc. Here also Hercules was born

and achieved his victories over the Lernean hydra and the Nemean lion.

The ancient capital, Argos, was situated about 3 m. from the sea, and was considered the oldest city in Greece. It was supposed to have been built by that Inachus of whom we have spoken, or by his grandson Argus; but as the whole period in which his deeds are said to have been accomplished belongs to the unhistorical age, we cannot possibly determine the truth of such a statement. It is certain, however, that at one period A. was the head of a league composed of several Doric states or cities—Cleonæ, Phlius, Sicyon, Trœzen, Hermione, Ægina, and Epidaurus. Latterly, Sparta robbed it of its supremacy and influence. The population of A., during its most prosperous condition in ancient times, was—inclusive of the town-territory—upwards of 100,000. It was noted for the attention it paid to the worship of the gods. Juno was the principal divinity, but many of the other gods had temples and statues also. This gave a stimulus to the fine arts, and we know that A. had one of the most famous of the ancient schools of statuary. The natives were, moreover, renowned for their love of music. Herodotus considered them the finest musicians in Greece. They do not seem to have cultivated literature. Few poets, and no orators or philosophers, were born among them. The modern Argos, built on the site of the ancient, is 7 m. from Nauplia, and is a large and thriving town. It still exhibits some remains of antiquity, though these were nearly wholly destroyed in 1825, during the Greek war of independence. Cotton, vines, and rice are grown. Pop. 11,000.

ARGON, n. *âr′gŏn* [Gr. *a*, without; and *ergon*, work]: a name given on account of its remarkable inertness, never having been found united chemically with any element, and resisting all attempts to cause it thus to unite, which accounts for the fact that it has so long escaped recognition. Lord Rayleigh, for 7 years having been engaged in the determination of the densities of the commonest gases with all the precision obtainable by modern appliances, found, in 1892, that nitrogen obtained from the air was slightly heavier than that made from chemical compounds, and thus was led to suspect the existence of a heavier gas in the air. In 1785, or more than a century ago, Cavendish had noted that while the greater part of atmospheric nitrogen when mixed with oxygen could be oxidised by the aid of an electric spark to products absorbed by potash, a portion always remained unchanged; and this result raised with him the question whether the nitrogen of the atmosphere was all of one kind. With regard to this residue he said, 'We may safely conclude that it is not more than $\frac{1}{120}$ of the whole.' This fraction is now known to be very nearly the relation between argon and the air. Lord Rayleigh continued his experiments and succeeded in separating from atmospheric nitrogen this heavier gas, by the method of Cavendish. In the meantime, quite independently, Prof. Ramsay isolated the same substance

from the same source by means of red hot magnesium, and then, in 1894, these two investigators, one a physicist and the other a chemist, combining their labors announced the discovery of argon in the atmosphere. They proved that this gas formed about 0.8 or 0.9 per cent of the volume of the nitrogen. The first step in the examination of this new substance was to obtain a large quantity of it which was no easy task. The most satisfactory of the three methods that have been employed was to withdraw the oxygen from the air by means of red hot copper, and after removing the aqueous vapor and carbonic acid gas to pass the residue back and forth for many hours over a mixture of magnesium and dry lime heated very hot, which has the power of uniting with the nitrogen but not with the argon.

The leading physical properties of this substance are the easiest, and hence the first to be determined. Argon is a colorless and inodorous gas, having a density about 20 times that of hydrogen, and much more soluble in water than either oxygen or nitrogen. Hence the air that is dissolved in water contains a larger proportion of argon than atmospheric air. In unboiled water we drink a greater proportion of dissolved argon than we inhale of it while breathing. It is present in the air to an extent by volume of 0.935 per cent, so that a person inhales daily about 20 litres of this gas.

Prof. Olszewski of Cracow, a well known authority on the liquifaction of gases, has both liquified and solidified argon. The liquid is clear and colorless. Liquid air has a faint blue color due to the blue color of its oxygen. The solid is a crystalline mass resembling ice. The density of the liquid at its boiling point is about 1.5. The critical temperature of argon is —121°, at which temperature the gas is liquified by a pressure of about 50 atmospheres. The boiling point of argon under atmospheric pressure is —186.9°. A very slight reduction of temperature below its boiling point is sufficient to freeze it to a white solid—the melting point of which is —189.6°, that is less than 3° below the boiling point. The purification of argon and its complete separation from the other gases with which it is associated was accomplished by Prof. Dewar by liquifying argon by means of liquid hydrogen and then submitting it to a process of fractional distillation. Prof. Crookes has studied the spectra of argon and found that no other gas yields spectra at all like argon. Nitrogen and argon each give two spectra. One of the nitrogen shows fluted columns and the other sharp lines. Both of the argon spectra consist of sharp lines one being red and the other blue. The sharp line spectrum of nitrogen has no lines common with the sharp line spectra of argon. In 1895 Prof. Ramsay, while searching for a natural source of combined argon, was led to examine the gases in certain uranium metals. He experimented with cleveite and obtained from it argon mixed with some other gas which was identified by Prof. Crookes by spectroscopic examination as helium (q. v.) a

gas discovered during the total eclipse of 1868 in the chromosphere of the sun, and never obtained before from any terrestrial object. Argon and helium have also been found in meteoric iron from Virginia. They are monatomic and chemically inert so far as present evidence goes. This inertness makes their study from the chemical side very difficult. Any advance in our knowledge of these elements may be looked for from the physicist. M. Bertholet claimed to have caused a combination of argon with benzine, but other experimenters have not succeeded in confirming this result. With regard to the position of these substances in the periodic system of the elements it is premature to speculate until we know whether or not they are mixtures of gases. At present there is no chemistry of these new gases lately discovered in the atmosphere. The only light that can be obtained as to the complexity of their molecules is by determining the ratio of their specific heats through the wave length of sound. This is found to be 166, which is the same as that of mercury vapor, the only other monatomic gas in which this ratio has been determined. In the diatomic gases the ratio is 1.4. Ramsay's book, *The Gases of the Atmosphere* (1896) gives an excellent account of the chemistry of the air, from the earliest times down to 1896. Our knowledge of argon and its allies, however, is growing rapidly, so that some of his statements are no longer true. Travers' *The Experimental Study of Gases* may also be consulted with advantage.

ARGONAUT, n. *âr'gō-nawt* [L. *argonau ta:* Gr. *argonau'tēs*, an Argonaut—from *Argo*, Jason's ship: Gr. *nautĕs*, a sailor (see ARGEAN)]: one who sailed in the ship *Argo;* the paper-nautilus, a cephalopodous molluck. ARGOSY, n. *âr'gŏ'sĭ* [Sp. *Argos*, the *Argo*]: a merchant-ship richly laden: a large merchant-ship.

AR'GONAUT (*Argonauta*): genus of cephalopodous Mollusca, generally known by the name of *Paper Nautilus*, and in consequence of similarity in the form of the shell, often confounded with the genus *Nautilus* (q. v.), but in fact much more nearly allied to the Poulpe (*Octopus*). The shell is not chambered like that of the true nautilus, but has one spiral cavity, into which the animal can entirely withdraw itself. The animal has no muscular attachment to the shell, and some naturalists therefore suspected that it might be merely, like the Hermit Crab, the inhabitant of a shell originally belonging to some other animal; but this question has been set at rest by the observations of Madame Power, proving the beautiful but fragile shell to be the production of the A. itself. It has, however, also been discovered that the shell is peculiar to the female A., and does not answer the ordinary purposes of the shells of mollusca, but rather that of an 'incubating and protective nest.' The eggs, which are very numerous, are attached to filmentary stalks, and by these the whole compacted mass is united to

the involuted spire of the shell, where it is usually concealed by the body of the parent. The descriptions, until recently admitted into the works of the most reputable naturalists, of argonauts sailing about in pretty little fleets upon the surface of the water, employing six of their tentacula as oars, and speading out two, which are broadly expanded

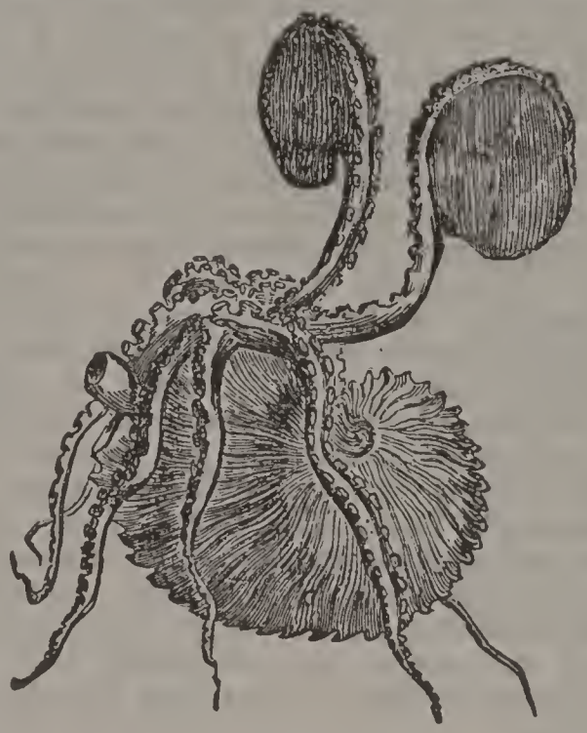


Fig. 1.

for the purpose, as sails to catch the breeze, are now regarded as entirely fabulous, and indeed are founded upon a misapprehension of the position of the animal in its shell, and of the use of the two expanded arms or *vela* (sails). The membranes of these arms are extended at the pleasure of the animal, so as to envelop the shell, and appear to be

Fig. 2.

the secreting organs employed in its fabrication. Two species of A. are common in the Mediterranean. Fig. 1 represents one of them as it used to be commonly repre sented with oars and sails. Fig. 2 represents it as it really exists, with the membranes of the dorsal arms covering the shell. The other arms are cut off. At *a*, in Fig. 2, is seen the mass of eggs.

ARGONAUTS, *ar'gō-nawts:* heroes of Greek antiquity [so named from their ship *Argo*], who, according to tradition, about a generation before the Trojan war, undertook a long voyage into unknown seas, under the command of Jason. Homer alludes to the story; Hesiod, Mimnermus, Pindar, the Pseudo-Orpheus, and many others relate it, all in different ways, the accounts in some instances being utterly irreconcilable. The plainest and most complete narrative is that of Apollodorus, as follows: Jason was commissioned by his uncle, Pelias—who ruled over Iolcus, in Thessaly—to fetch from the country of Æetes (Colchis) the golden fleece of the ram, which was suspended on an oak, and guarded by a sleepless dragon. He therefore caused Argus, the son of Phrixus, to build a ship of 50 oars; and in pursuit of this adventure gathered together the choicest heroes from all parts of Greece, 50 in number, with whom he sailed. The first landing-place was Lemnos, where the A. stayed two years, because the women, in consequence of the wrath of Aphrodite, had slain all the men, excepting Thoas. Next they sailed to the Doliones, and were hospitably received by King Cizycus, who was afterwards accidentally killed by Jason. After landing at Mysia, where they left Hercules and Polyphemus—who had wandered too far inland in pursuit of the lost Hylas—they came to the country of the Bebryces, where King Amycus was killed by Pollux, or Polydeuces, in a pugilistic fight. They next sailed along the coast of Thrace to Salmydessus, where two of their number, Zetes and Calais, having delivered the blind seer, Phineus, from certain winged monsters called Harpies, he in return gave them good counsel respecting their future adventures, and especially warned them against the dangerous passage between the opening and closing Symplegades, from which they escaped with but little injury to their vessel. The story goes that Phineus advised the A. to let loose a dove when they approached the dreaded rocks, and to judge from its fortune what they themselves might expect. The bird escaped with the loss of its tail. The A. resolved to risk the passage, and after heroic efforts got safely through, their ship only losing some of the ornaments of its stern. After visiting several other lands, they arrived at the mouth of the river Phasis in Colchis. Here the king, Æetes, promised to give up the golden fleece to Jason, on condition that the latter should yoke to a plough the two fire-breathing bulls with brazen hoofs, and should sow the dragon's teeth left by Cadmus in Thebes. Jason, by the help of the famous sorceress Medea, daughter of Æetes, who had fallen passionately in love with the bold navigator, fulfilled these conditions; and was also assisted by Medea in still more wonderful exploits. He obtained from her, under promise of marriage, a charm against fire and steel, and was enabled to destroy all the warriors who sprang up from the land sown with the dragon's teeth. While this was taking place, Æetes had resolved to burn the ship *Argo*, and put to death the crew; but Jason, informed of the scheme by Medea, anticipated it, hastened into the

grove, stupefied the dragon-sentinel by an opiate charm prepared by Medea, seized the golden fleece, and, embarking in the *Argo* with his mistress and her brother Absyrtus, sailed away from Colchis by night. Æetes followed, but was hindered in his pursuit by an atrocity committed by his fierce daughter. It is said that she slew her brother Absyrtus, and cut him into several pieces, which she threw overboard, one at a time. While King Æetes stayed to gather up the fragments of his son, Jason escaped from the pursuit. The A. now reached the mouth of the river Eridanus; but were driven on the Absyrtian Islands by a storm sent from Jove who was angry on account of the murder of Absyrtus. Meanwhile the mast of the *Argo*—which had been cut from the sacred grove of Dodona—delivered an oracle to the effect that Jove could not be appeased unless they sailed towards Ausonia, and were purified through the expiatory agency of Circe. This was accomplished; and, next, the A. passed by the Sirens, from whose charms they were preserved by Orpheus, who sang to them, but could not hinder one of their number, Butes, from swimming off to the sea-maidens; then through Scylla and Charybdis, by the help of Thetis, and at length landed on the island of Corcyra, where Alcinous ruled. On leaving this place, they encountered a storm at night, but were saved by Apollo, who, in flashes of lightning, revealed to them the haven of Anaphe, where they raised an altar to their preserver. At Crete, their landing was opposed by the giant Talus, who was slain by Medea. They subsequently touched at Ægina, and, sailing between Eubœa and Locris, arrived safely at Iolcus, after a four months' voyage. Jason dedicated the good ship *Argo* to Neptune, at the Isthmus of Corinth.

It is perhaps useless to speculate on the real character of the Argonautic expedition, even if it be more than a mere myth. The accounts given by other writers differ so widely, especially in the geographical parts, from those of Apollodorus, that it becomes impossible to determine satisfactorily whether the expedition sailed north, east, or west. The common historical interpretation of the legend is that Jason sailed on a voyage of discovery, which had for its aim and stimulus the hope of new commercial relations; others would modify this hypothesis, and suggest that the enterprise was partly commercial, partly piratical, and partly adventurous, and that Jason's crew was in all probability composed of young, restless, and ambitious spirits, who were ready for anything that might turn up.

ARGOS: see ARGOLIS.

ARGOSTOLI, *âr-gŏs'tō-lē:* seaport on the s.w. of Cephalonia; cap. of the island; lat. 38° 10′ n., long. 19° 59′ e.; its quay is a mile long. Pop. 8,000.

ARGOT, n. *âr-gŏt* [F. *argot*, slang]: one of the wanderers or waifs of society; the secret or cant language of London thieves.

ARGOVIE: see AARGAU.

ARGUE, v. *âr'gū* [L. *argu'ĕrĕ*, to declare; F. *arguer*,

It. *arguire—lit.*, to make clear]: to debate or discuss; to reason; to dispute. AR'GUING, imp. ARGUED, pp. *ár'gūd.* AR'GUER, n. one who argues. ARGUMENT, n. *ár'gū-mĕnt*, a reason alleged or offered; a discussion. ARGUMENTABLE, a. *ár'gū-mĕn'tă-bl*, that may be argued. AR'GUMENTA'TION, n. *-tā'shŭn*, reasoning; the act of reasoning. AR'GUMEN'TATIVE, a. *-tă-tĭv*, consisting of argument; given to argument. AR'GUMEN'TATIVELY, ad. *tĭv-lĭ.* AR'GUMEN'TATIVENESS, n. the quality of being argumentative.—SYN of 'argue': to debate; dispute; deliberate; discuss; contend; evince; reason; expostulate; remonstrate; manifest; prove;—of 'argument': argumentation; reason; reasoning; discussion; controversy; proof.

ARGUELLES, *ár-gwĕl'yĕs*, AUGUSTIN: a prominent Spanish politician 1776, Aug. 28-1844, Mar. 23. b. Ribadesella. On the breaking out of the war of independence in 1808, he went to Cadiz, where he agitated for the organization of a regency, with a free constitution, as the best method of consolidating the resources of the nation. In 1812, he was sent as representative of his native province to the cortes, where he was appointed one of the members of the committee to whom was intrusted the drawing up of the plan of a new constitution. His splendid talents as a public speaker soon won him the admiration of the liberal party, who used to term him the Spanish Cicero. But on the return of Ferdinand VII., A. fell a victim to the reactionary spirit which ensued, and, 1814, May 10, he was arrested and imprisoned; but at his trial he displayed such dexterity that it was found impossible to convict him. Different judges were nominated five successive times, but they could not agree in their decision. At last the monarch himself passed sentence, which was, that A. should be confined for ten years in the prison at Ceuta. He was not, however, alone in his misfortunes. Fourteen persons were condemned with him, among whom was his friend Juan Alvarez Guerra. In their confinement they experienced such barbarous treatment that in four years three died, two became mad, and the rest received grievous injuries. The revolution of 1820 restored them to freedom. A. became minister of the interior, but soon resigned, in consequence of the king complaining of the weakness of the executive. Although provoked beyond measure by the narrow bigotry of the court, he did not rush into extremes, but continued a constitutional liberal to the end of his life. In the cortes at Seville in 1823, he voted for the suspension of the royal power; but after the violation of the constitution he fled to England, where he remained till the amnesty of 1832. On his return to Spain, being nominated to the cortes, he was repeatedly made president and vice-president of the chamber of deputies, and always showed himself a moderate but unwavering reformer. In July, 1841, on the discussion of the law regarding the sale of church property, he delivered himself strongly against all concordats with the pope. Next to Espartero, he was the most popular man in the kingdom with the enlightened party. During the regency, he was appointed guardian to the

young queen, Isabella, but died soon after at Madrid. In his old age he still exhibited the fiery eloquence that marked his youth.

AR'GUMENT, in Logic: properly, the ground or premise on which a conclusion is rested; popularly it is applied to a series of reasons alleged, or to a controversy. *Argumentation* is reasoning put into regular shape, with a view to convince or silence an objector. Logicians have given distinctive names to various kinds of arguments. Thus, we have the *Argumentum ad hominem*, which is no real proof, but only an appeal to the known prepossessions or admissions of the persons addressed. In this style, when a man upholds one method of fraud, he may, by an appeal to his consistency, be driven to uphold another. The A. *ad veritatem*, again, has no regard to anything save objective truth. Next we have the A. *e consensu gentium*, or an appeal to the common belief of mankind, which, of course, may be used to prove or disprove anything. The A. *a tuto* rests upon the supposed safety or prudence of adopting a certain conclusion. It is sometimes used by Roman Catholics against Protestants in the following form: Protestants teach that salvation is possible in any church; this is denied by Catholics; therefore, it is safer to belong to the Catholic Church, as even the Protestant admits that a man may be saved in that church. Lastly, the *Argumentum a baculo* (or use of the cudgel), though objectionable, may be called concise in its style, and has settled many controversies.

ARGUMEN'TUM AD HOM'INEM: see ARGUMENT.

ARGUS, n. *âr'gŭs:* in Gr. and L. Myth., son of Zeus and Niobe, succeeded Phoroneus in the government of the Peloponnesus, which took from him its name of Argos, as did also the territory of Argolis.

ARGUS, a fabled being surnamed Panoptes (all-seeing), had one hundred eyes, some of which were always awake. He was enormously strong, and on account of his wonderful exploits Juno appointed him to watch over Io, transformed into a cow. Mercury being commissioned by Zeus to carry off the cow, slew A. by stoning him; or, as Ovid says, first charmed him to sleep by playing on the flute, and then beheaded him. Juno used the eyes of A. to decorate the peacock's tail. The name A. is used to designate a very watchful person.

ARGUS: the builder of the ship *Argo*. See ARGONAUTS.

AR'GUS or ARGUS PHEASANT: genus of gallinaceous birds, remarkable for magnificence of plumage. The only known species is *A. giganteus*, formerly called *Phasianus A.*, and still, very generally, the A. pheasant. The sides of the head and neck are destitute of feathers; the tail consists of twelve feathers, of which the two middle ones in the male are very much elongated; the secondary feathers of the wings are much longer than the primary. The name A. has allusion to the many beautiful eye-like markings which adorn the plumage of the male, and particularly the secondaries of the wings. The long secondaries are said to impede the flight of the bird; but

its wings are much employed to aid it in running. The female is of comparatively tame plumage, not only wanting the eye-like markings, but even the great length of the secondaries and of the middle tail-feathers. The size of the bird, when divested of its plumage, is not much greater than that of a common barn-door fowl, but the tail-feathers

Argus Pheasant (*A. giganteus*).

of the male are nearly four ft. long. The A. is a native of Sumatra and other eastern islands, of the peninsula of Malacca, Siam, etc. It is said to be found even in the n. parts of China. It is impatient of confinement, and has very seldom been brought alive to Europe.

ARGUTE, a. *âr'gūt* [L. *argūtus*, sharp, piercing]: acute; shrewd; subtile. ARGUTE'NESS, n. acuteness or wittiness.

ARGYLL, *âr-gīl'*, ARCHIBALD CAMPBELL, Marquis of, 1598–1661: an eminent political character of the 17th c.; succeeded to the earldom of A. 1638. Already he had shown that religious principle which marked his whole life, and that perilous union of attachment to the king and of faith in the principles against which the king made war. In the general assembly at Glasgow, 1638, Nov., he openly took the side of the Covenanters, and thenceforth became recognized as their political head. In 1640, he commanded a military expedition through Badenoch, Athole, Mar, and Angus, for the purpose of enforcing subjection to the Scottish parliament. On the king's visit to Scotland, in 1641, he found it convenient to show peculiar favor to A., and created him a marquis. On the breaking out of hostilities, A. was still desirous for negotiation, but was finally compelled to take the field. In April, 1644, he dispersed the royalist forces under the Marquis of Huntly, in Aberdeenshire. He was less successful in withstanding

the genius of Montrose, who, 1645, Feb. 2, almost annihilated his army at Inverlochy. His estates had suffered so much in the preceding year from the ravages of the brilliant cavalier, that a sum of public money was voted for his support. In Aug., 1646, he went to London, with Loudon and Dunfermline, to treat with the parliament for a mitigation of the articles presented to the king. He was at the same time the bearer of a secret commission from the king to treat with the Duke of Richmond and the Marquis of Hertford, on the propriety of a Scottish demonstration in favor of Charles. On the defeat of the 'Engagement' plan, to which he had been decidedly opposed, the government of Scotland devolved on A. and the other Presbyterian leaders. In the parliament of Feb. 1649, Charles II. was proclamed king, and at Scone, 1651, Jan. 1, A. put the crown on his head. At this time it was even said that the complaisant monarch intended to marry one of his daughters. As head of the committee of estates, A. took vigorous measures to oppose Cromwell's invasion of Scotland, and still adhered to the king, after the subjugation of the country. After the battle of Worcester, he retired to Inverary, where he held out for a year against Cromwell's troops. Falling sick, he was taken prisoner by General Dean. He refused submission to the Protector, but took an engagement to leave peaceably, which he strictly kept. On the Restoration, he repaired to Whitehall, encouraged by a flattering letter from the king to his son. Impeached with the crime of having submitted to the usurper (to whom he had refused allegiance), he was committed to the Tower, and 1661, Feb. 13, was brought before the Scottish parliament on the charge of treason. He defended himself with spirit, but in vain. He was condemned, and suffered death at Edinburgh, May 27, having displayed dignity and meekness through his trial, and on the scaffold.

ARGYLL, Archibald (Campbell), 9th Earl of: son of Archibald Campbell, Marquis of A.: was early distinguished by personal accomplishments, and exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the royal side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to the parliamentary leaders, that he was specially excepted by Cromwell from the act of grace in 1654. After much harassing persecution, he submitted to the parliament, but continued to be closely watched. On the restoration of Charles II., he was received into high favor (as a balance to the execution of the death sentence on his father), and, unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish legislature. He had, however, numerous and active enemies; and, on the ground of an intercepted letter, in which he had complained of neglect, he was tried and condemned to death by the Scottish parliament for the imaginary crime of *læsa majestas*. The influence of Clarendon restored him to liberty and favor; even the king himself was favorable to him; but his explanation in

subscribing the infamous test framed by the Scottish parliament in 1681 was declared treasonable, and he was again condemned to death. The devotion of his wife enabled him to escape from Edinburgh Castle in the disguise of a page; and after remaining concealed some time, he fled to Holland. Landing in the n. of Scotland, 1685, May, with an armed force, to co-operate in the revolt of Monmouth, he was, after a series of misfortunes, taken prisoner, hastily condemned, and beheaded 1685, June 30. His son Archibald, one of the deputation sent by the Scottish convention to present the crown to the Prince of Orange, was created Duke of Argyll, 1701.

ARGYLL, George John Douglas (Campbell), 8th Duke of: b. 1823; succeeded his father in 1847. At the age of 19, his grace, then Marquis of Lorne, wrote a pamphlet entitled *A Letter to the Peers from a Peer's Son,* on the subject of the struggle which ended in the disruption of the Scottish Church. Seven years later he published an essay on Presbytery, which contains a historical vindication of the Presbyterian system. On taking his seat in the house of peers, he soon commanded the respect of that dignified assembly. On the formation of the coalition ministry by Lord Aberdeen, his grace was invested with the office of Lord Privy Seal, which he continued to hold in Lord Palmerston's administration. In 1855, he became postmaster-general. In Palmerston's next ministry, formed in 1859, he again successively held the same office. Mr. Gladstone appointed him secretary of state for India in 1868 and again in 1880. He resigned office in 1881, disapproving the Irish Land Bill. In 1874, he had supported the abolition of patronage in the Church of Scotland. In 1854, he was chosen lord rector of the Univ. of Glasgow: in 1855, presided at a meeting of the British Assoc. in that city; and in 1861, was elected president of the Royal Soc. of Edinburgh. His grace was hereditary master of the queen's household in Scotland, chancellor of the Univ. of St. Andrews, trustee of the British Museum, also hereditary sheriff and lord-lieut. of Argyleshire. Besides numerous papers on zoology, geology, etc., he published *The Reign of Law,* 1866; *Primeval Man,* 1869; and, in 1870, *A History of the Antiquities of Iona.* An important work by him on the *Unity of Nature* appeared 1884. His eldest son, the Marquis of Lorne, married the princess Louise in 1871; and in 1878 was appointed governor-general of Canada. (The ducal title A. was formerly spelt Argyle.) D. 1900, April 24.

ARGYLL, John (Campbell), 2d Duke of: 1678–1743, Sept. 3: son of the first Duke of A.: took an important part in the political and military affairs of his time. As royal commissioner in 1705, he had a principal share in bringing about the Act of Union. As a soldier, he distinguished himself under Marlborough at Ramilies, Oudenarde, Lille, Ghent, and Malplaquet. Previous to the change of ministry in 1710, A. had been a keen whig. He now veered with the wind of the court, and became a declaimer against the Duke of Marlborough. As the

reward of his apostasy, he was appointed by the tories generalissimo of the British army in Spain; but considering himself unhandsomely treated by the ministry, he shortly afterwards returned, and finding his influence greatly diminished, he again became a whig. His career up to the rebellion of 1715 was most tortuous and unprincipled, and seriously detracts from his meritorious services during that critical period. He was, however, completely successful in quelling disturbances, and his services were rewarded in 1718, among other dignities, with an English peerage, and the title of Duke of Greenwich. His restless vanity and ambition, however constantly prompted him to political intrigues. In 1721, he again played into the hands of the tories, for the purpose of securing the entire patronage of Scotland. In 1737, he rose into immense popularity in his own country, by his spirited defense before parliament of the city of Edinburgh in regard to the Porteous mob. He died on the 3d Sept. 1743. He was a man of lax principles and selfish character, but possessed of considerable shrewdness and talent, and noted for kindness and courtesy in private life, which procured him the title of 'the good Duke of Argyll.'

ARGYLESHIRE, *âr-gīl'shēr* [*Airer-Gaedhil*, territory of the Gael]: a county in the w. of Scotland, cut up into many peninsulas by arms of the sea, and including numerous islands. It is bounded n. by Inverness-shire; w. and s. by the sea; e. by Perthshire, Dumbarton, Loch Long, and Firth of Clyde. Its greatest length is about 115 m.; greatest breadth, about 60 m.; its extent of coast-line is very great, amounting to 663 m., owing to the indentation of the coast by numerous lochs running inland. Next to Inverness, it is the largest county in Scotland—area, 3,210 sq. m., of which 1,063 are occupied by the numerous islands. No part is above 12 m. from the sea or from large inland lochs. The county is divided into the districts of Cantire, North and South Argyle, Lorn, Appin, Cowal, Morven, and Sunart. The chief islands are Mull, Islay, Jura, Tiree, Coll, Lismore, and Colonsay, with Iona and Staffa. There are upwards of thirty other islands of smaller size. The general aspect of A. is wild and picturesque, marked by rugged and lofty mountains and deep inland bays. There are some fertile valleys. The n. part is entirely mountainous, and presents some of the grandest scenery in Scotland, as Glencoe. The chief bays are (going south)—Loch Moidart, Loch Sunart, Linnhe Loch, branching off into Loch Eil and Loch Leven, Loch Fyne, and Loch Long. There are no rivers of any size. The streams are short and rapid, the principal being the Urchay, running through Glenorchy into Loch Awe, and the Awe, connecting that lake with Loch Etive. The inland or fresh-water lochs are Loch Awe and Loch Lydoch. The rocks of A. are mica-slate, which predominates on the mainland; trap in Mull and Lorn; quartz rock in Islay and Jura; granite around Loch Etive and in Knapdale; patches of lias and oolite in many

of the isles; and a little old red sandstone w. of Loch Fyne and in South Cantire. Lead-mines occur at Strontian (where the mineral Strontianite was discovered, and from which the names of the earth called *Strontia* and the metal *Strontium* are derived), at Tyndrum, and in Islay and Coll. There is a copper-mine in Islay. The Easdale and Ballachulish quarries supply the best roofing slates in Scotland. Coal occurs near Campbelton; fine marble in Tiree, etc.; excellent granite near Inverary; and limestone in most parts of the county. The fertile parts of A. lie along the arms of the sea and the mountain streams. The soil is mostly a light, sandy, and gravelly loam, along the coasts and the sides of rivers, and gravelly, with a till bottom, on the hillsides. Sheep and cattle rearing are the chief occupations of the farmer. More sheep are reared in A. than in any other Scotch county, and nearly a million acres are in permanent pasture. Another important industry is the fishing of herring, cod, and ling, which abound on the coast.

In many parts of A. the peasantry are still very poor, notwithstanding that steamers now connect every portion of the coast with the commercial centre of Scotland. The manufactures are unimportant, the chief being whisky, in Campbelton and Islay, and coarse woolens for home use. The chief towns and villages are Inverary, Campbelton, Oban, Dunoon, Lochgilphead, Tarbert, and Tobermory. The three former unite with Ayr and Irvine in returning one member to parliament; the county returns another. This extensive county is divided ecclesiastically into not more than fifty parishes, which contain only two royal burghs, Inverary and Campbelton, the former of which is a station of the Circuit Court of Justiciary. The principal proprietors are the Duke of Argyle, the head, and the Earl of Breadalbane, a branch of the Campbell family. Among the antiquities of A. are the ruins of Iona and Oronsay, and many *duns*, or circular forts, along the coast. In Cantire formerly lived the Macdonalds, or Lords of the Isles, whose power was weakened by James III. Pop. (1881) 76,440; (1901) 73,665, mostly using the Gaelic language.

ARGYNNIS: a name of Venus (q.v.).

ARIA, n. *ār'ĭ-ă* [It. *arĭă;* F. *air*, breath—from L. *āĕr*, air]: an air or tune, in *music;* a rhythmical song, as distinct from recitative. The term was formerly applied to a measured lyrical piece either for one or several voices; but is now commonly applied to a song introduced in a cantata, oratorio, or opera, and intended for one voice supported by instruments. ARIETTA or ARIETTE, a short melody or tune. ARIOSO, a passage in the style of the A., often introduced into recitative. A. BUFFO, a comic song, etc.

ARIADNE, *â'rĭ-ăd'nē:* in Legend, daughter of Minos, king of Crete, by Pasiphaë. When Theseus, with the offerings of the Athenians for the Minotaur, landed in

Crete, A. conceived a passion for the beautiful stranger, and gave him a clew by means of which he threaded the mazes of the labyrinth, and was enabled to slay the monster. For this service Theseus promised to marry her, and she escaped with him, but was slain by Diana on the island of Naxos.—According to another tradition, A. was left by Theseus at Naxes, where she was found by Bacchus returning from his triumph in India, who was captivated by her beauty, and married her. At her death he gave her a place among the gods, and suspended her wedding-gown as a constellation in the sky. A., as left forsaken by Theseus, and as married to Bacchus, has been a favorite subject with artists.

ARIALDUS, *a-rĭ-al′dus:* a deacon of the church of Milan, during the 11th c.; prominent in the ecclesiastical contentions of his times. The Rom. Cath. Church in the n. of Italy was then very corrupt, a wide-spread licentiousness, originating from the unnatural institution of priestly celibacy, prevailing. Great numbers of the clergy kept concubines openly. Such as looked earnestly in those days at his flagrant evil were disposed to consider the strict enforcement of celibacy the only effectual cure. Chief among these reformers stood A., whose life was one continued scene of violent controversy. Although successively sanctioned by Popes Stephen X., Nicholas II., and Alexander II., he found little sympathy among his brethren, and used to complain that he could get only laymen to assist him in his agitation. Having at length succeeded in obtaining a papal bull of excommunication against the Abp. of Milan, a fierce tumult ensued in the city, whose inhabitants declared against A. and his coadjutors. A. now fled to the country; but his hiding-place being betrayed, he was conveyed captive to a desert isle in Lake Maggiore, where he was murdered by the emissaries of the abp., and his remains thrown into the lake, 1066, June 28. He was afterwards canonized by Pope Alexander II.

ARIAN, n. *ā′rĭ-ăn:* one adhering to the doctrines of *Arĭŭs*, who taught that Jesus was inferior to God, and that the Holy Spirit is not God: Adj. pertaining to Arius. Arianism, n. *ā′rĭ-ăn-ĭzm*, the doctrines of the Arians. See Arius.

ARIA′NA: see Aryan Race.

ARIANO, *â-rē-â′nō* (*Arianum*): city of s. Italy, province of Avelino, beautifully stiuated, 2,800 ft. above the sea, in one of the most frequented passes of the Apennines; 50 m. n.e. from Naples. It is a bishop's seat, and has a fine cathedral. Pop. (1901) 17,650.

ARIAS MONTANUS, *a′rĭ-ăs mŏn-tā′nŭs*, Benedictus: 1527–1598: b. in the village of Frexenal de la Sierra, among the mountains separating Estremadura from Andalusia: a Rom. Cath. divine, noted as a linguist. He studied at Seville and Alcalá de Henares, where he distinguished himself in the acquisition of Arabic, Syriac, and Chaldee. On

a tour through Italy, France, Germany, England, and the Netherlands, he obtained a knowledge of various modern tongues. He was at the celebrated Council of Trent; but on his return to his own country he gave his whole time to literature. In 1568, Philip II. persuaded him to superintend at Antwerp the publication of the famous edition of the 'Polyglot Bible,' executed in that city at the suggestion of the printer, Christopher Plantin. After four years' labor the work, issued under the title *Biblia Sacra, Hebraice, Chaldaice, Græce, et Latine, Philippi II. Regis Catholici Pietate et Studio ad Sacrosanctæ Ecclsiæ Usum Chph. Plantinus excudebat,* was received with universal applause; though the Jesuits, to whom A. was strenuously opposed, alone attempted to fasten the charge of heresy on the author, who made several journeys to Rome to clear himself of the accusation. Philip II. rewarded him with a pension of 2,000 ducats, besides various other emoluments. He died at Seville. His literary works are very numerous. They relate principally to the Bible and to Jewish antiquities; but he also wrote a poem on Rhetoric, and a History of Nature.

ARICA, *â-rē′kâ*: a seaport of Chile, 30 miles south of the town of Tacna, with which it is connected by railway. It is still a port of some consequence, but has suffered much from earthquakes. During the war between Chile and Peru it was bombarded by the Chilean forces, and it passed into the possession of Chile in 1883. The chief exports are silver and silver ore, copper, bark, chinchilla skins, and alpaca wool. From this port the silver from the mines of Potosi used to be shipped for Europe. Pop. about 4,000.

ARICHAT, *â-re-shât′:* seaport of Cape Breton Island, province of Nova Scotia, with a harbor for the largest vessels. It is near the Gut of Canso, the most southerly of three channels of communication between the Gulf of St. Lawrence and the Atlantic. The town is largely engaged in fishing, and at the head of its harbor a lead-mine has been opened. Pop. abt. 2,000.

ARID, a. *ăr′ĭd* [L. *arĭdus,* dry: F. *aride*]: dry; devoid of moisture. ARIDITY, n. *ă-rĭd′ĭ-tĭ,* or AR′IDNESS, n. dryness; want of moisture.

ARIDAS, *âr′ĭ-dâs* [from some of the Indian languages]: a kind of taffeta from the East Indies woven of fibres from various plants.

ARIÈGE, or ARRIEGE, *â′rē-āzh′:* river in the s. of France, rises in the dept. of the East Pyrenees, flows through a beautiful vale, and falls into the Garonne near Toulouse.

The dept. of ARIÈGE, along the n. slopes of the Pyrenees, formed a part of the old county of Foix, the territory of Couserans, and the province of Languedoc; bounded n. and w. by Haute Garonne, e. by Aude, s. by the republic of Andorra and the Pyrenees. It contains some of the highest mountain-summits in France; the dept., nevertheless, has a mild climate. Area, 1,890

sq. miles. The inhabitants are engaged chiefly in agriculture, pasturage, iron mines, and the manufacture of woolens, linen, pottery, etc. The three arrondissements are Foix, Pamiers, and St. Girons. Chief towns—Foix, Pamiers, St. Girons. Pop. of A. (1891) 227,491; (1901) 210,527.

ARIES, n. *ār′ĭ-ēz* [L. a ram, an anc. battering-ram]: the Ram; one of the signs of the zodiac, including the first 30 degrees of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place. The vernal equinox, or, as it is also called, the first point of A., is constantly changing its position among the fixed stars, in consequence of the precession of the equinoxes, moving w. at the rate of 50″.2 annually. It is from this circumstance that the sign A. no longer corresponds with the constellation A., as when, about 2,000 years ago, the ecliptic was divided into 12 equal parts called signs, each named after the group of stars through which it passed. The present sign A. is in the constellation Pisces, about 30° w. of the original sign; and although the sun at the vernal equinox will always be at the first point of A., yet nearly 24,000 years will elapse before that point will again coincide with the beginning of the constellation A.

ARIGHT, ad. *ă-rīt* [AS. *ariht*, on right]: in a proper form; rightly; without mistake.

ARIKARA, *ă-rē′kă-ră:* the designation of a tribe of North American Indians of the Caddoan stock now living on the Fort Berthold Reservation in North Dakota. They number about 400 and speak a dialect of the Pawnee language.

ARIL, n. *ăr-ĭl′*, or ARILLUS, n. *ăr-ĭl′lŭs* [F. *arille*, an arillus: Sp. *arillo*, a small hoop—from *aro*, a hoop—from L. *arĭdus*, dry]: a peculiar covering of the seed in some plants, formed by an expansion of the *funiculus* (the cord which attaches the ovule to the *placenta*,) or of the placenta itself, as in the pulpy A. of the white water-lilies and passion-flowers, and in the hairs of the willow-seed. This expansion takes place after fertilization, and sometimes invests the seed entirely, sometimes only partially. ARILLED, a. *ăr-ĭld′*, or ARILATE, a. *ăr-ĭl′āt*, having an aril. ARIL LODE, n. *ăr′ĭl-ōd* [Gr. *eidos*, resemblance]: an investment, somewhat similar to the A., but derived from the neighborhood of the micropyle, as in the mace of the nutmeg.

ARIMASPIANS, *ăr′ĭ-măs′pĭ-anz:* the name of a people whom the Greek legends represented as living in the extreme northeast of the ancient world. They are represented as one-eyed, and carried on perpetual war with the gold-guarding griffins, whose treasure they endeavored to steal.

ARINOS, *â-rē′nōs:* river of Brazil, which after a n.w. course of 700 m., enters the Tapajos, itself an affluent of the Amazon; lat. 9° 30′ s., and long. 58° 20′ w.

ARI′ON: a celebrated lute-player, native of Methymna,

in Lesbos, about B.C. 700: regarded by the ancients as the inventor of the dithyrambic metre. According to a tradition first given by Herodotus, afterwards decorated by the poets, A. was sent by Periander, ruler of Corinth, to Sicily and Italy, and at Tarentum won the prize in a poetical contest. As he returned laden with gifts in a Corinthian ship, the avaricious mariners determined to slay him and seize his wealth; of this the poet-musician was forewarned by Apollo in a dream. He asked for permission to try his skill in music; and after playing on his lute, threw himself from the deck into the sea. Here several dolphins, charmed by his music, had assembled round the vessel. On the back of one of them the musician rode safely to the promontory of Tænarus, where he landed, and journeyed on to Corinth. The sailors, who, arriving afterwards, assured Periander that A. was dead, were confronted with him, when they confessed their guilt, and were crucified. The lute and dolphin were raised among the constellations; and the story became a favorite theme with artists. A. W. Schlegel, in one of his best poems, gives this story of A.

ARIOSTO, *â-re-os'to,* LUDOVICO: one of the greatest of Italian poets: 1474, Sep. 8—1533, June 6; b. Reggio; eldest son of the military governor of that city. He was bred to the law, but abandoned it for poetry. However, at an early period of life, he was compelled to exert himself for the support of a large family, left as a burden on him at the death of his father. His imaginative powers were developed in early life. In 1503, after he had written two comedies, with several lyrical poems in Latin and Italian, he was introduced to the court of the Cardinal Hippolytus d'Este, who employed him in many negotiations. Here, in Ferrara, in about ten years, he produced his great poem *Orlando Furioso,* pub. in that city, in one vol. 4to, in 1516, in forty cantos. After the death of the cardinal, the duke, his brother, invited the poet to his service, and acted to him with great kindness and liberality. In the early part of 1521, a second edition of his poems was published, the *Orlando Furioso* being still in forty cantos. Shortly after he was commissioned by the duke to suppress an insurrection which had broken out in the wild mountain-district of Garfagnana; a task which seems more like a punishment than a mark of honor. A., however, succeeded in this arduous undertaking; and after remaining three years governor of the quarter, he returned to Ferrara, where he lived comfortably, nominally in the service of his patron, but in reality enjoying what he highly prized—an abundant leisure for prosecuting his studies. It was at this time that he composed his comedies, and gave the finishing touch to his *Orlando.* At length, in the latter part of 1532, that poem made its appearance in a third edition, enlarged to its present dimensions of forty-six cantos. He now became seriously ill of a painful internal distemper, of which, after a few months of suffering, he died on the 6th of June, 1533, in his fifty-ninth year, and was buried in the church of San Benedetto, at Ferrara, where a magnificent

monument indicates the resting-place of his remains. A is described as a man of noble personal appearance and amiable character. His *Orlando Furioso* is a romantic, imaginative epic, marked by great vivacity, playfulness of fancy, and ingenuity in the linking together of the several episodes. It takes its name and its theme from a chivalrous romantic poem by Boiardo, the *Orlando Innamorato.* That poem treats of the wars between Charlemagne and the Saracens, confounded as they were by tradition with those of Charles Martel, wherein Orlando, or Roland, stood forward as the champion of Christendom. Orlando is the hero of Boiardo's piece, and falls in love with Angelica, a clever and beautiful oriental princess, sent by the Paynim to sow discord among the knights of the Christian armies. The story of this lady, being left unfinished in the *Orlando Innamorato,* is taken up by A., who makes her fall in love herself with an obscure squire Medoro, on which Orlando gets furious, and long continues in a state of insanity. Besides his great work, A. wrote comedies, satires, sonnets, and a number of Latin poems, all more or less marked with the impress of his genius. In 1845, Giamperi, a librarian of Florence, announced that he had discovered at Argenta, near Ferrara, an autograph manuscript by A., containing a second epic, *Rinaldo Ardito,* describing, like the *Orlando,* the battles of Charlemagne and his paladins against the Saracens. The manuscript had been mutilated, and contained in a complete form only the cantos 3, 4, 5, while 2 and 6 were imperfect; and it was stated that the entire poem had consisted of twelve cantos. The work was published under the title *Rinaldo Ardito di L. Ariosto, Frammenti Inediti Pubblicati sul Manuscritto Originale* (Florence, 1846). In genius and style, it has been found by critics not to accord with the *Orlando.* Of the *Orlando* there are many English translations: by Harrington (1607 and 1634); Croker (1755); Huggins (1757); Hoole (1783); and by Stewart Rose (1823). In the last only is there to be found a fair representation of the feeling and spirit of the original. One of A.'s comedies had been rendered into English by Gascogne as early as the year 1566.

ARIOVISTUS, *ā'rĭ-ō-vĭs'tŭs* [probably the latinized form of the German *Heer-fürst,* army-prince]: a German chief in the century before Christ, leader of the Marcomanni and other German tribes, who was requested by the Sequani, a Gallic people, to assist them in a contest against the Ædui. Having gained a victory for the Sequani, A. was so well pleased with their fine country (now Burgundy), that he and his followers determined to abide there. Many other Germans followed him into Gaul, where he soon collected an army of 120,000 men. The Gallic people turned now for help towards the Romans, and Cæsar demanded an interview with A., who proudly replied, that 'he did not see what Cæsar had to do with Gaul.' After another message from Cæsar had been treated in the same scornful manner, the Roman forces under Cæsar advanced and occupied Vesontium (now

Besançon), the chief city of the Sequani. A furious engagement took place (B.C. 58), in which Roman discipline prevailed over the German forces, which were utterly routed. A., with only a few followers, escaped over the Rhine into his own country. His subsequent history is unknown.

ARISE, v. *ă-rīz'* [AS. *arisan:* Goth. *reisan:* Icel. *risa,* to arise: Ger. *reisen,* to start]: to get up; to come into view; to ascend. ARI'SING, imp. AROSE, pt. *ă-rōz',* got up. ARISEN, pp. *ă-rĭzn',* got up; mounted upwards.—SYN. of 'arise': to mount; ascend; climb; scale; proceed; issue; spring; flow; emanate.

ARISPÉ, *â-ris'pā :* t in Sonora, the extreme n.w. dept. of the Mexican Confederation. It is in the Sierra Madre, the w. range of the Rocky Mountains, on the banks of the Sonora, which is said to lose itself in an inland lake. The surrounding district abounds in the precious metals, as also in cotton, wine, grain, and live stock. Pop. (est.) 7,600.

ARI'STA AND ARIS'TATE: see AWN.

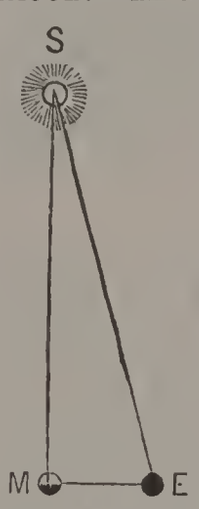
ARISTÆUS, *ăr'ĭs-tē'ŭs* [from a Greek word signifying *the best*]: an ancient divinity whose worship in the earliest times was widely diffused throughout Greece, but whose myth is remarkably obscure. According to the common tradition, he was the son of Apollo and Cyrene, the latter the grand-daughter of Peneius, a river-god of Thessaly. She is said to have given birth to A. on the coasts of Libya, in Africa, whence the region is alleged to have derived its name of Cyrenaica. Hermes placed the child under the protection of the Horæ, the fosterers of cities, culture, and education. According to another tradition, A. was the son of the nymph Melissa, who fed the infant with nectar and ambrosia, and afterwards intrusted his education to Chiron. The great diversities in the legend were probably caused by the fusion into one of separate local divinities, whose functions were similar, and whose histories were, in consequence, carelessly commingled. After A. left Libya, he went to Thebes, in Bœotia, where he was taught by the Muses the arts of healing and prophecy, and where he married Autonoë, the daughter of Cadmus, by whom he had several children. After the unfortunate death of his son Actæon (q.v.), he went to Ceos, where he liberated the inhabitants from the miseries of a destructive drought by erecting an altar to Zeus *Icmæus*—i.e., the rain-maker. He now returned to his native land; but shortly after set out a second time on a voyage of beneficence. He visited the islands of the Ægean Sea, Sicily, Sardinia, and Magna Græcia, leaving everywhere traces of his divine benignity. At last he went to Thrace, where he was initiated into the mysteries of Dionysus; and after a brief residence in the vicinity of Mount Hæmus, he disappeared from the earth.

This myth is one of an extremely pleasing character, from the invariable beneficence which is attributed to A. It is less disfigured by anthropopathic errors than most of the

myths of Greek divinities. A. was specially worshipped as the protector of vine and olive plantations, and of hunters and herdsmen. He also trained men to keep bee-hives, and averted the burning heats of the sun from tne open fields. Later mythology often identified A. with the higher gods Zeus, Apollo, Dionysus.

ARISTARCH, n. *ăr'ĭs-târk* [from *Aristar'chus* of Alexandria]: a severe critic.

ARISTARCHUS, *ăr'ĭs'tăr-kŭs*, OF SAMOS: a celebrated ancient astronomer, of the Alexandrian school, who lived, B.C. 281–264. All his writings have perished, except a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and the moon from the earth, by the angle formed by the two bodies at the observer's eye at that moment when the moon is exactly half-luminous. It will be obvious from a glance at the annexed figure that the three bodies must then form a right-angled triangle, of which the moon is at the right angle. The angle MES then being observed, it is easy to find the ratio between EM and ES. This is quite correct in theory; but the impossibility of determining when the moon is exactly half-illuminated renders the method useless in practice. Besides, in the days of A. there were no instruments for measuring angles with anything like accuracy. A. estimated the angle at E at 83°, and determined EM to be $\frac{1}{20}$ of ES; the truth being that the angle at E differs only by a fraction of a minute from a right angle, and that EN, the distance of the moon from the earth, is about $\frac{1}{400}$ of ES, the distance of the sun. According to some accounts, A. held, with the Pythagorean school, that the earth moves round the sun; but this seems to be a mistake. Vitruvius speaks of A. as the inventor of a kind of concave sun-dial.



ARISTAR'CHUS, of SAMOTHRACE: a grammarian, who lived abt. B.C. 150 in Alexandria, where he founded a school of grammar and criticism, and educated the children of Ptolemy Philopator. His life was devoted chiefly to the elucidation and restoration of the text of the Greek poets, especially of Homer. The form in which we now have the Homeric poems preserved is in a great measure owing to his judgment and industry. The strictness of his critical principles has made his name a general term for a severely just and judicious critic. Being afflicted with an incurable dropsy, he ended his life by voluntary starvation at the age of 72. The fragments of his writings that have been preserved are to be found scattered through the *Scholia* on Homer, first published by Villoison (Venice, 1788).

ARISTATE, a. *ă-rĭs'tāt* [L. *ăris'ta*, a beard of corn]: furnished with beards, like barley and many grasses: awned.

ARISTEAS, *â-rĭs'tē-ăs:* an entirely fabulous character

who may be styled 'the Wandering Jew' of popular tradition in ancient Greece. First we find A. teaching Homer; then, some ages afterwards, born at Proconnesus, an island in the Sea of Marmora. It is stated that having visited the Arimaspæ, the gold-watching griffin, and the Hyperboreans, he died on his return home; but, soon afterwards, a traveller asserted that he had been met and accosted by A. Consequently, neighbors searched the house where the body of A. was supposed to be lying, but it could not be found. Seven years afterwards, he appeared as an author, and wrote a poem entitled *Arimaspeia*, in three books, giving accounts of northern and central Asia, which were copied by Herodotus and others. After thus establishing himself as a poet, he vanished again; and after 340 years of mystery reappeared at Metapontum, in the south of Italy, where he advised the people to erect an altar to Apollo, and an altar to 'the everlasting Aristeas,' assuring them that, when Apollo founded their city, he (A.), in the form of a raven, had accompanied the god, and had assisted in the ceremony. In the early controversy of the Christian Church, heathens sometimes quoted this tale of A. as a counterpart to the miracles recorded in the New Testament.

ARISTI'DES, surnamed 'THE JUST': son of Lysimachus, and descended from one of the best families in Athens: d. B.C. 468. He was one of the ten leaders of the Athenians against the Persians at the battle of Marathon (B.C. 490). It had been arranged that each leader (or *strategos*) should hold the supreme command for one day; but A., who saw the folly of this want of unity, induced his companions to give up their claims, and make Miltiades commander-in-chief, which proved the means of winning the battle. In the following year, A. was chief archon, and in this position, as in every other, secured the general respect of the citizens. Some years later, probably because he had opposed the plans of Themistocles, that unscrupulous leader brought about the banishment of A. It is said that when an illiterate citizen, who did not know him personally, requested him to write his own name on the voting shell, he asked the man whether A. had injured him. 'No,' said the voter; 'but I am weary of hearing him always styled "the Just."' A. submitted to the sentence with dignity, praying to the gods, as he left the city, that the Athenians might not have cause to repent of their decision. Only three years later, Xerxes, with an overwhelming force, had invaded Greece. A., hearing that the Greek fleet was surrounded by that of the Persians, hastened from Ægina to apprise Themistocles of the danger, and offer his aid. After taking a prominent part in the battle of Salamis, A. was restored to popular favor, and soon afterwards aided greatly in achieving the victory at Platæa, in which he commanded the Athenians. In B.C. 477, he introduced a change of the constitution, by which all citizens without distinction of rank, were admitted to political offices. As showing the confidence reposed in A., it is related that Themistocles having announced that he had a scheme very

advantageous for Athens, but which he could not disclose in a public assembly, A. was deputed to consult with Themistocles on the subject. The plan was to secure the naval supremacy of Athens by burning all the vessels of the other Greek states, her allies, then lying in a neighboring harbor. A. reported to the people that nothing could be more advantageous than the plan of Themistocles, but nothing could be more unjust; and the matter was immediately rejected by the people. After a variety of other public services, A. died in old age, and universally respected, so poor that it is said his funeral had to be provided for by the public.—He left a son and two daughters, for whom provision was made by state bounty.

ARISTIPPUS, *ăr'ĭs-tĭp'pŭs:* founder of the Cyrenaic school of philosophy among the Greeks: b. Cyrene, Africa, abt. B.C. 424; son of Aritades, a wealthy gentleman of that city. Having come over to Greece to attend the Olympic games, he heard so much of Socrates, that he was filled with an eager desire to see the sage, and hurried to Athens, where he became one of his pupils. He remained with Socrates up nearly to the last moments of the great teacher, though he does not at any period seem to have followed his doctrines or his practice. We know that subsequently he was the object of strong dislike, both to Plato and to Antisthenes the Stoic. He passed a considerable part of his life in Syracuse, at the court of Dionysius, the tyrant, where he acquired the reputation of a philosophic voluptuary. That his manners must have been at once extremely graceful and accommodating, is clear from the saying of his opponent, Plato, who declared that 'A. was the only man he knew who could wear with equal grace both fine clothes and rags.' Diogenes Laertius records a number of his *dicta*, some of which take the form of *bons-mots* and indicate a sharp, cutting, lively, and self-complacent nature. A. lived also at Corinth, in intimacy with the famous courtesan Laïs, but towards the close of his life he is supposed to have retired to Cyrene. His daughter Arete seems to have been a person of superior abilities, inasmuch as her father imparted his leading doctrines to her, and she to her son, A. the Younger (hence called *Metrodidaktos,* 'taught by the mother'), by whom they are supposed to have been systematized. A. in all probability published nothing during his life. He prided himself more upon spending his days in what he conceived to be a philosophical manner, than in elaborating a philosophical system for the benefit of the race.

The Cyrenaic school, all the teachers of which were probably imbued with the spirit of A., and merely carried out his doctrines to their legitimate results, professed a great contempt for speculative philosophy, and for physical and mathematical knowledge. They confined their investigations to morals, and formed an ethical system completely in harmony with the gay, self-possessed, worldly, and skeptical character of their master. The chief points of the Cyrenaic system were: 1. That all human sensations are either pleasurable or painful, and that pleasure and pain are the only criterions

of good and bad. 2. That pleasure consists in a gentle, and pain in a violent, motion of the soul. 3. That happiness is simply the result of a continuous series of pleasurable sensations. 4. That actions are in themselves morally indifferent, and that men are concerned only with their results. Wieland in his historico-philosophical romance, *Aristipp und einige seiner Zeitgenossen* (A. and Some of his Contemporaries), presents us with a charming picture of the life and opinions of the great philosophic sensualist, who stood out in strong relief against the gloom and austerity of Antisthenes and the Cynical school. The doctrine that makes pleasure the chief good is often called *Hedonism*.

ARISTOBULUS, *â-rĭs'tō-bū'lŭs:* an Alexandrian Jew who lived under Ptolemæus Philometer abt. B.C. 175, and was considered by the early Fathers as the founder of the Jewish philosophy in Alexandria. He was long considered the author of the *Exegetical Commentaries on the Books of Moses* which went under his name, but it is now admitted that the work in question was the composition of a later period. Only fragments of it remain. It was intended to show that the oldest Greek writers borrowed from the Hebrew Scriptures; and to support this theory, numerous quotations were professedly taken from Linus, Musæus, Orpheus, etc., of which the Christian apologists made abundant use. These, however, have long been considered forgeries, inasmuch as they do not exhibit a trace of the antique Greek spirit, but make the writers speak in the tone and style of the Old Testament (see Valckenær's treatise). For the Hasmonean or Maccabee prince A., see JEWS.

ARISTOCRACY, n. *ăr'ĭs-tŏk'ră-sĭ* [Gr. *aris'tokratĭ'a*, the rule of the best born—from *aristos*, best; *kratos*, rule, strength]: government by nobles; the nobility or chief persons of a country. ARISTOCRAT, n. *ăr-ĭs'tō-krăt* or *ăr'ĭs-tō-krăt'*, one who favors an aristocracy; one of the nobles; *familiarly*, a haughty person. ARISTOCRATIC, a. *ăr'ĭs-tō-krăt'ĭk*, or AR'ISTOCRAT'ICAL, a. *-ĭ-kăl*, belonging to the aristocracy; *familiarly*, very dignified; haughty. AR'ISTOCRAT'ICALLY, ad. *-lĭ*. AR'ISTOCRAT'ICALNESS, n. the quality of being aristocratical. ARISTOCRATISM, n. *ăr'ĭs tō-krăt'-ĭzm*, the principles or habits of aristocrats. AR'ISTOCRATIZE', v. *-krăt-īz'*, to raise from a lower to a higher level in the social scale, as by education, investing with the franchise, etc.

ARISTOC'RACY [Gr. *aristocratia*, from *aristos*, best, and *kratos*, power]: means etymologically the power or government of the best, noblest, or most worthy; and in the sense which it originally bore, A. had reference not to a social class, but to a form of government in which the sovereignty was placed in the hands of a minority of the citizens of the state, exclusive altogether of the slave population, which generally existed in antiquity. It is in this sense also that we use it when we speak of the Italian states of the middle ages as aristocracies. In order to constitute an A., it was further necessary that the minority which composed it should consist of the highest class, in point not of wealth alone, but of

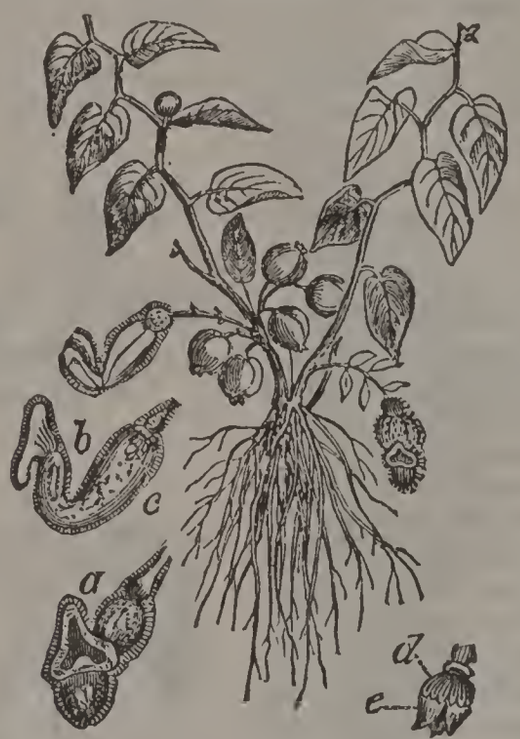
birth and culture; the government of a minority in numbers simply, being known by the more odious name of an *oligarchy*. Were the whole government of England intrusted to the house of lords, even though that body were to become vastly more numerous than it is, so long as it did not include half of the adult males, and were not elective, but hereditary, the country would be ruled by an A., and its rulers would be aristocrats in the antique sense of the term. In this, its political sense, the term A. has never been acclimatized in England, because the thing which it signifies has always been unknown. The territorial nobility, though possessing great influence in the government of the country, has, at every stage of its career, been controlled either by the crown from above or the commons from below; and thus it is that, though more important in social influence than in any other country, the English A. has never assumed the form of a ruling class. When used with reference to English society, the term A. has two significations—a narrower and a wider one. According to the first, it is nearly synonymous with *nobility* (see that title and its relative subdivisions). According to the second, it is synonymous with *gentry*, and includes the whole body of the people, titled and untitled, above a certain very indefinite social line. Perhaps the nearest approximation which we shall make to a definition of A. in this, its proper English sense, will be by adopting that which Aristotle has given, not of *aristocratia*, but of *eugeneia*, or good birth. 'Good birth,' he says, 'is ancient (long-inherited) wealth and virtue.' (*Politic.* lib. iv. c. 7.) The question as to the extent to which either of these qualities is requisite to constitute a claim to admission into the ranks of the A., is one to which probably not two persons, either within or without the pale, would return the same answer; but that the absence of either would be a ground of exclusion is a point on which there will be little difference of opinion. In England, no amount of mere wealth will, in general, confer it either on a tradesman or his immediate descendants (see GENTLEMAN); and scarcely any deeds, however noble, will give it to him who is not the possessor of inherited fortune. Neither Burns the gauger, nor Shaw the life-guardsman, has ever been regarded as an aristocrat, though nobody denies that the one was a poet, and the other a hero. But when the claim to recognition as an aristocrat has been inherited, it will scarcely be lost by the individual himself, however adverse may be his worldly circumstances, or however ignoble his conduct; and it is not difficult to imagine an elevation of moral tone which would confer it even on a beggar. In the United States, the claim to A. is scarcely asserted under that term; and the term itself is scarcely used except with some suggestion of opprobrium; though the thing indicated may be claimed or sought for under another name.

ARISTOGEI'TON: see HARMODIUS and ARISTOGEITON.

ARISTOLOCHIA, *ă-rĭs'tŏ-lō'kĭ-ă:* genus of plants of the natural order *Aristolochiaceæ* or *Asarineæ*. This order, which is dicotyledonous or exogenous, consists of herbaceous plants or shrubs, often climbing shrubs, and contains upwards of 130 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of S. America. The leaves are alternate, simple, stalked, often with a stipule; the flowers axillary, solitary, hermaphrodite, of a dull color; the perianth at its base adhering to the ovary, tubular, sometimes regular, but generally very irregular; the stamens 6–12, epigynous (or inserted upon the ovary), distinct, or adhering to the style; the ovary is generally six-celled, with numerous ovules; the style simple. the stigmas radiating, as numerous as the cells of the ovary; the fruit dry or succulent; the seeds with a very minute embryo at the base of fleshy albumen.—The genus A. is distinguished by a tubular oblique perianth, generally inflated at the base, the mouth dilated on one side, and by stamens adherent to the style, so that it is included in the Linnæan class *Gynandria*. The species are mostly shrubby, and natives of tropical countries, some of them climbing to the summits of the loftiest trees. Several are found in the south of Europe; one only, the common Birthwort (*A. Clematitis*), occurs upon the European continent as far n. as about lat. 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem, heart-shaped dark-green leaves on long stalks, the flowers stalked, and growing to the number of sometimes seven together from the axils of the leaves, the tube of the perianth about an inch long, and of a dirty yellow color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *A. rotunda* and *A. longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *A. Indica* is used in the same way by the Hindoos.—*A. serpentaria*, Virginian Snakeroot, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8–10 inches high, bearing heart-shaped very acute leaves. The flowers are on stalks, which rise

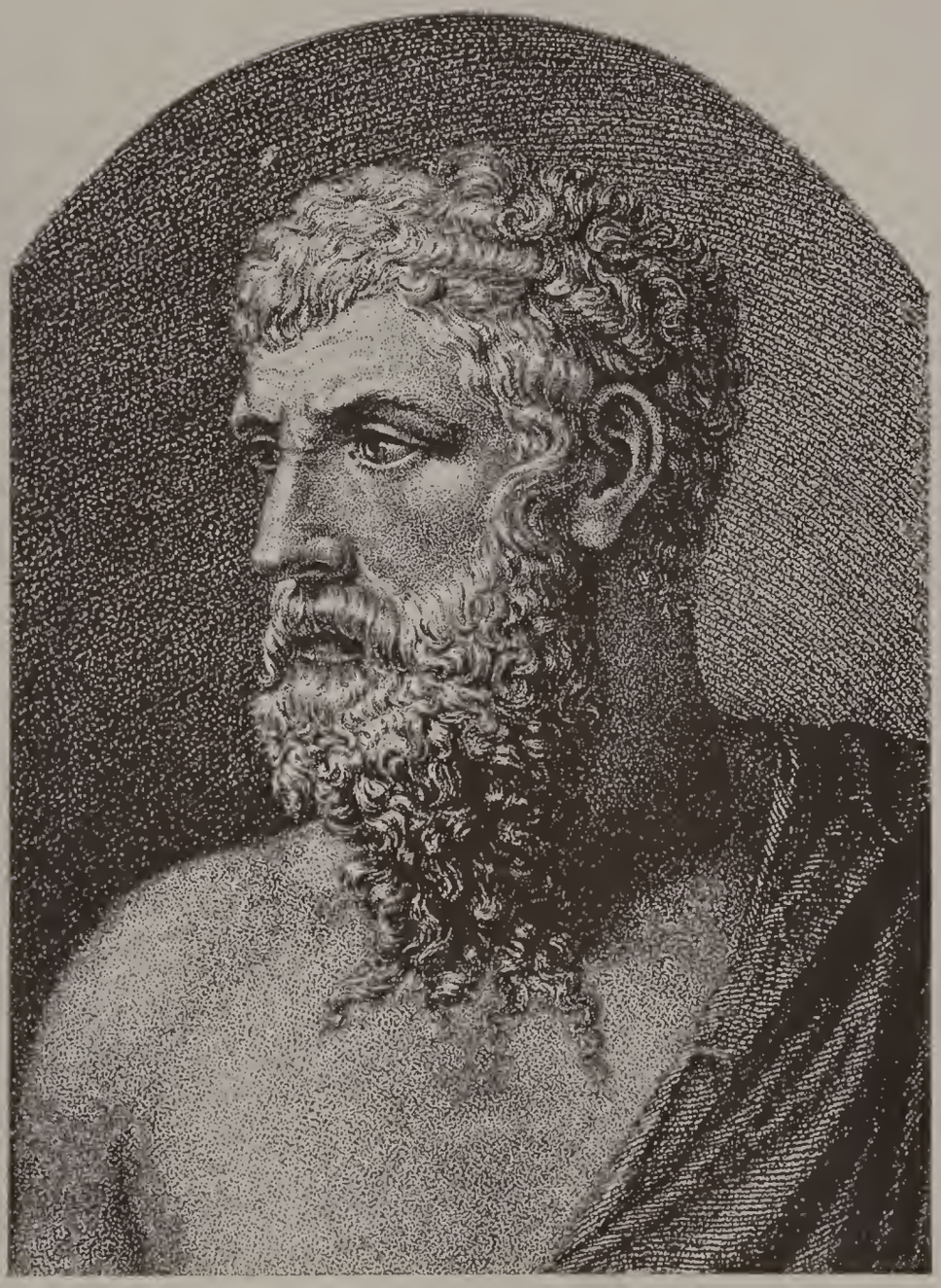
Aristolochia Clematitis.

from the root; the orifice of the perianth is triangular. The root has a penetrating resinous smell, and a pungent, bitter taste. It has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant and tonic properties. It is an article of export from the United States to Europe, and bears a high price, being highly esteemed as a medicine in certain kinds of fever.—Its reputation as a cure for serpent-bites is shared by other species, particularly *A. anguicida* and *A. guaco* (the Guaco of Colombia), natives of the warmer parts of America. The juice has certainly the power of stupefying, and even of killing, serpents; and it is said that a number of species are used by Egyptian jugglers, in order to their handling serpents with impunity. —Several South American species seem also to possess medicinal properties analogous to those of the Virginian snakeroot.—*A. Sipho,* a climbing shrub, of 15–20 ft. in height, a native of the southern parts of the Alleghany Mountains, is frequently planted in the United States, in Britain, and on the continent of Europe, to form shady bowers. It has very large heart-shaped leaves (a foot in breadth) of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked in its upper part, inflated at the base, and veined with reddish-brown veins, having a sort of resemblance to



Aristolochia Serpentaria:
a, a flower; *b*, a flower not open, showing the parts of fructification *c*; *d*, the stamens; *e*, the stigmas.

the bowl of a tobacco-pipe, for which reason the shrub is sometimes called Pipe-shrub, Pipe-vine, or Dutchman's Pipe.—The tropical species are distinguished for their beauty and the peculiar forms of their flowers. Some of them are much prized ornaments of our hot-houses. The genus ASARUM also belongs to the order *Aristolochiaceæ.*



ARISTOPHANES.

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ARISTO'PHANES, *ăr'ĭs-tŏf'a-nēz:* the only writer of the old Greek comedy of whom we possess any entire works: b. Athens, abt B.C. 444; son of one Philippus. We know very little of his history. Plato, in his *Symposium,* relates that he was fond of pleasure —a statement which it is easy to credit when we consider the tendencies of his profession in all ages. It seems equally clear, however, from the vigorous and consistent expression of his convictions in his various works, and from the fearless manner in which he assails the political vices of his day, that he was possessed of an honest and independent spirit. He appeared as a comic writer in the fourth year of the Peloponnesian war (B.C. 427). The piece which he produced was entitled *Daitaleis* (the Banqueters), and received the second prize. It ridiculed the follies of extravagance, and like all his subsequent works, was pervaded by a contempt of modern life, and an admiration of the sentiments and manners of the earlier generations. Next year, he wrote the *Babylonians,* in which he satirized Cleon, the so-called demagogue, so sharply, that the latter endeavored to deprive him of the rights of citizenship, by insinuating that he was not a real Athenian. This in all probability gave rise to the various traditions of A. having been born in Rhodes, Egypt, etc. Fragments of these plays remain. In 425, his *Acharnians* obtained the first prize. It was written to expose the madness of the war then waging between Athens and Sparta, and exhibits the feelings of the 'peace-party' in the former city. It is still extant. In 424, appeared *Hippeis,* the *Knights* or *Horsemen.* It was the first which the poet produced in his own name, and evinces the singular boldness of the author. It is levelled against Cleon, and presents us with a striking picture both of a vulgar and insolent charlatan, and of the fickle, cunning, credulous, and rather stupid mob over whom he precariously tyrannizes. It is related of this piece that, when no actor would undertake to play the part of the powerful Cleon, A. himself impersonated the demagogue. Unfortunately for the character of Cleon as well as that of the Athenian democracy, these caricatures and misrepresentations of A. have been received as historical pictures. How far they are from the truth has been clearly shown by Grote in his *History of Greece.* See CLEON. In 423, A. produced the *Clouds,* which and the *Knights* are the two most famous of his comedies. They exhibit in overflowing richness that fancy, wit, humor, satire, and shrewd insight which characterize this greatest of all Greek comic writers. The *Clouds,* however, displays at the same time the weaknesses and limitations of A.'s mind. Its aim was to deride the pretensions of the new sophistical school, and to point out its pernicious tendencies. So far well. But A., who was no philosopher, demonstrates his own incapacity to appreciate the highest range of thought and character, by selecting no less a person than Socrates as the most perfect representative of a sophist. A., who was both religiously and politically conservative, had apparently no clearer conception of abstract truth than is in

volved in reverence for the sanctities of the past, the old gods, old traditions, old manners, and old sentiments. He had an instinctive hatred of innovations, and considered all equally pernicious. As he had represented Cleon the reformer as a vulgar innovator and demagogue, ruled by the lowest considerations, he makes the innovating views of Socrates also proceed from corrupt motives, veiled perhaps with more craft. Alcibiades is caricatured in this brilliant comedy as a wildly extravagant youth, whose career of ruin is accelerated by the insidious instructions of Socrates, and a hint is thrown out towards the end of the piece, which unfortunately proved to be the 'shadow' of a 'coming event.' A. represents the father of Alcibiades as about to burn the philosopher and his whole *phrontisterion* (subtlety-shop); and there can be little doubt that this dramatic vilification of the purest of heathen moralists led to that persecution which, twenty years later, culminated in his condemnation and death. In 422, appeared the *Wasps*, still extant, in which the popular courts of justice are attacked; and three years later, in his *Peace*, he returns to the subject of the Peloponnesian war, which is ridiculed with great cleverness. In 414, he produced two comedies, *Amphiaraus* and the *Birds*, both of which caricature, in the liveliest manner, the Sicilian expedition, then being meditated, but which proved so utter a failure. The *Lysistrata* belongs to the year 411, and exhibits a civil war of the sexes, as the monstrous issue of that in the Peloponnesus. In his *Plutus* and *Ecclesiazusæ*, which appeared in 408 and 392, he assailed the new passion for Doric manners and institutions, and ventured to ridicule Plato, in that, however, in which the philosopher is weakest—namely, his political theory. Euripides, also, as the sophist among poets, is severely handled in the *Frogs*.

A. wrote fifty-four comedies, of which only eleven are extant. He is acknowledged to stand far above all his contemporaries or successors of the middle and new comedy in wealth of fancy and beauty of language. His choruses sometimes exhibit the purest spirit of poetry; and Plato himself says that the soul of A. was a temple for the Graces. The ingenuity which he shows in the mechanical artifices of verse is not less wonderful. Frogs are made to croak choruses, pigs to grunt through a series of iambics, and words are coined of amazing length—the *Ecclesiazusæ* closes with one composed of 170 letters. It only remains to be added, that the personalities in which A. indulged descend at times into coarseness and indecency, and that even the gods whom he undertook to defend are treated with levity, and placed in the most ludicrous lights.

ARISTOPHANIC, a. *ăr'ĭs-tō-făn'ĭk* [from *Aristoph'anĕs* (q.v)]: shrewd; witty.

ARISTOTE'LIA: see MAQUI.

ARISTOTELIAN, a. *ăr'ĭs-tō-tēl'ĭ-ăn*, or ARISTOTEL'IC, a. [from *Aristotle* (q.v.)]: pertaining to Aristotle or his philosophy: N. a follower of Aristotle's philosophy. ARISTOTE'LIANISM, n. the Peripatetic system of philosophy founded by Aristotle.

ARISTOTLE.

ARISTOTLE.

ARISTOTLE, *ăr'ĭs-tŏt-l:* B.C. 384–322; b. at the Grecian colonial town of Stageira, on the w. side of the Strymonic Gulf (now the Gulf of Contessa, in Turkey in Europe). He belonged to a family in which the practice of physic was hereditary. A. lost both parents while he was quite young and was brought up under the care of Proxenus, a citizen of Atarneus, in Asia Minor, who was then settled at Stageira. It is to be conjectured that his education, such as it was, would take the direction of preparing him for the family profession, and that whatever knowledge and power of manipulation attached to the practice of physic at that time would be among his early acquisitions. In after-life, he occupied himself largely in the dissecting of animals and was acquainted with all the facts that had been derived from this source by others before him. It seems probable, however, that he early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake, in which he attained a distinction without parallel in the history of the human race.

In his 18th year (B.C. 367) he left Stageira for Athens, then the intellectual centre of Greece and of the civilized world. Plato, on whom he doubtless had his eye as his chief instructor, was then possibly absent at Syracuse in that extraordinary episode of his life, connecting him as political adviser with the two successive Syracusan despots—Dionysius the Elder, and Dionysius the Younger —and with Dion. A., therefore, pursued his studies by books, and by the help of any other masters he could find, during the first three years of his stay. On the return of Plato, he became his pupil, and soon made his master aware of the remarkable penetration and reach of his intellect. Unfortunately, there is a total absence of particulars or precise information as to the early studies of the rising philosopher. He remained at Athens twenty years, during which the only facts recorded, in addition to his studying with Plato, are, that he set up a class of rhetoric, and that, in so doing, he became the rival of the celebrated orator and rhetorical teacher, Isocrates, whom he appears to have attacked with great severity. One of the disciples of Isocrates, defending his master against A., wrote a treatise wherein allusion is made to a work (now lost) on proverbs, the first recorded publication of the philosopher.

The death of Plato (B.C. 347) was the occasion of A.'s departure from Athens. It was not extraordinary or unreasonable that A. should hope to succeed his master as the chief of his school, named the Academy. We now know that no other man then existing had an equal title to that preeminence. Plato, however, left his nephew Speusippus as his successor. We may suppose the disappointment thus arising to have been the principal reason for A.'s determination to stay no longer in Athens; but there are other reasons also that may be assigned, arising out of his relations with the Macedonian royal

family at a time when the Athenians and Philip had come into open enmity.

Whatever may be the explanation, he went in his 37th year, after a stay of nearly twenty years in Athens, to the Mysian town of Atarneus, in Asia Minor, opposite to the island of Lesbos. Here he lived with Hermeias, the chief of the town, a man of singular energy and ability, who had conquered his dominion for himself from the Persians, at that time masters of nearly all Asia Minor. A. had taught him rhetoric at Athens, and he became in return the attached friend and admirer of his teacher. For three years the two lived together in the stronghold of Atarneus; but by treachery and false promises, the Rhodian Mentor, an officer in the Persian service, got possession of the person of Hermeias, put him to death, and became master of all the places held by him. A. accordingly fled, and took refuge in Mitylene, the chief city of the neighboring island of Lesbos. He also took with him Pythias, the niece or adopted daughter of Hermeias, and made her his wife. In a noble ode, he has commemorated the merits of his friend thus lost to him through the treachery of a Greek renegade. His wife, Pythias, died a few years afterwards in Macedonia, leaving him a daughter of the same name. His son, Nikomachus, to whom he dedicated his chief work on ehtics—called, in consequence, the *Nikomachean Ethics*—was born to him at a later period of his life by a concubine.

After two years' stay at Mitylene, he was invited (B.C. 342, age 42) by Philip to Macedonia to educate his son Alexander, then in his 14th year. What course of study Alexander was made to go through, we cannot state. He enjoyed the teaching of A. for at least three years, and contracted a strong attachment to his preceptor, which events afterwards changed. The two parted finally when Alexander commenced his expedition into Asia (B.C. 334), and A. came from Macedonia to Athens, having recommended to the future conqueror, as a companion in his campaigns, the philosopher Callisthenes, whom he educated with Alexander. Now past the age of 50, he entered on the final epoch of his life; he opened a school called the 'Lyceum,' from its proximity to the temple of Apollo Lyceius. From his practice of walking up and down in the garden during his lectures probably arose the other name of his school and sect, the *Peripatetic*. It would appear to have been his habit to give a morning lecture to select pupils on the more abstruse subjects, and one in the evening of a more popular kind to a general audience. He may now be supposed to have composed his principal writings; but unfortunately, there is nothing known of the dates of any of them. This crowning period of his life lasted twelve years. After the death of Alexander, the anti-Macedonian party at Athens obtained ascendency, and among other consequences, an accusation was prepared against A., the pretext being impiety. With the fate of Socrates before his eyes he chose a timely escape,

and in the beginning of B.C. 322 took refuge at Chalcis in Eubœa, where in the autumn he died, aged 62. He had long been afflicted with indigestion, and probably succumbed to that malady.

The writings of A. may be said to have embraced the whole circle of the knowledge of his time. Many of them are lost; those that remain refer principally to the following departments.

Astronomy, Mechanics, Physics, were treated of by him at some length; but here his failure was complete, if we look at his writings from the point of view now acquired. He was the victim of capricious fancies, based upon doctrines common among his contemporaries, accepted by him as principles of reasoning, and conducting him to the most unsound conclusions. His theory of the rotation of the sphere, the necessary perfection of circular motion, of the impossibility of a vacuum, and the like, did more to confuse than to explain the phenomena of nature. Nor can it be said that the time was not ripe for putting these subjects on a rational basis; for he was very shortly followed by a series of men, who both observed and reasoned soundly respecting them, and laid the foundation of their subsequent progress—namely, Euclid, Apollonius, Archimedes, Eratosthenes, and Hipparchus.

In his great work on Animals A. has amassed a stock of genuine observations, and also introduced a method of classification which continues to this day as the most approved groundwork of zoological classification. In this work we see, perhaps, in the most advantageous light, the two great qualities of his mind, rarely coupled in the same individual—the aptitude for observation, and logical method. The excellence shown in his various writings generally depends upon one or other of these qualities.

A considerable portion of his writings relate to the Human Mind and Body. In one of these, a short treatise on Memory and Recollection, he gave the first statement of the laws of Association of Ideas.

His Organon, or Logic, is his complete development of formal reasoning, and is the basis and nearly the whole substance of syllogistic logic. This science he almost entirely created. Mr. Grote observes (*History of Greece*, part ii. chap. lxviii) that 'what was begun by Socrates, and improved by Plato, was embodied as a part of a comprehensive system of formal logic by the genius of A.; a system which was not only of extraordinary value in reference to the processes and controversies of its time, but which also, having become insensibly worked into the minds of instructed men, has contributed much to form what is correct in the habits of modern thinking.'

The writings on the *First Philosophy*, commonly called the *Metaphysics*, consist of a larger (but by no means complete) treatise and of several smaller ones, some of which are not genuine. In this work A. considers those characteristics of existent things which are common to

all, as opposed to those that are to be found only in special realms. There are four; the Form, or Nature; the Matter, or Substratum; the Mover, or Effective Cause; and the Purpose, or End. These four are, however, finally reduced to two, *the Form and the Matter*. The matter is the potential, or germinal being (e.g. an egg); the form is the fully developed creature, or subject, (e.g. the bird). That is, nature has two fundamental elements, first, that which is constantly being transformed as one thing after another arises and decays, only in turn to become another thing, in short, matter; and secondly, that which creates and gives to things their properties and constitutes itself the goal of their existence, in short, the indwelling creative germ, the form.

These forms correspond to Plato's Ideas. They are not thought of as anything that exists apart from matter, for properly speaking the only existent is the individual thing. It is they that we are in search of when we try to know and understand things. That is, science seeks the universal properties of objects; and these properties, or forms, are preeminently that which makes the world what it is and that accordingly deserve to be known. Nor is matter to be thought of as ever existing in a formless state, for as such it too is a mere abstraction. It is, however, a very real element in things, for it gives them their capacity for transformation (potentiality). It is also the ultimate source of their imperfection (perhaps resisting transformation by a sort of inertia), and at the same time it is that which gives rise to the individuality of things.

There exists one pure, or immaterial form. Inasmuch as all motion, or transformation, must arise through the agency of some external efficient cause, A. argues that the ultimate source of motion in the world must be some moving cause outside the world, itself never moved, that is, the deity. The deity is then the eternal creative form, immaterial and therefore perfect. He is not subject to change (actuality unmixed with potentiality).

Regarding nature A. held the following views: There is no empty space, or vacuum. Space is limited and the world within it is finite. Beyond the world there is no space. Time, however, has no beginning nor ending, nor has the world. The round earth rests in the center of the universe. About it revolve the heavenly spheres containing the fixed stars and other heavenly bodies. The heavens, the sphere of the fixed stars, is first in the source of its motion, being moved immediately by the deity; and it has the highest kind of motion, changeless and circular. The motion of the planets is explained by the hypothesis of many spheres variously moved by unmoved immaterial beings, lesser gods. There are five elements, ether, fire, air, water, and earth. The earth and its inhabitants constitute an ascending scale of higher and higher forms (or more perfect subjection of matter to the forming principles), from the lifeless to the living, from the plants to the animals, and from brute to man. Each higher stage adds to the lower its peculiar form.

His treatises on Rhetoric and Poetics were the earliest development of a Philosophy of Criticism, and still continue to be studied. The same remark is applicable to his elaborate disquisitions on Ethics. The highest goal, or form, of human activity is happiness, or well being. This cannot consist in mere living or in the functioning of our lower nature, but in the realization of moral and intellectual perfection, or virtue. A. adds that the two are identical.

Perhaps one of his greatest works is his Politics, based upon a collection made by himself of 158 different constitutions of states; the collection itself being unhappily lost except the recently found *Constitution of Athens.* Here is seen the spirit of the inductive observer, which indeed is no less apparent in works already mentioned. It is however, a singular fact, that he gives no evidence of having read the historian Thucydides; and his only reference to Herodotus is on a point of natural history. Yet the narratives and descriptions contained in the works of both these writers are probably of as much value, and as much in point, in a Political Philosophy, as the very best observations made by himself.

Of all the Greeks A. has been preeminently the teacher of Europe, especially is this true of the period from 1200 A.D. to the 17th c. His metaphysics was accommodated to the doctrines of the church and thus altered is still taught in Roman Catholic colleges and seminaries. Reference to the influence of his Logic has already been made. Finally it was against his physical and astronomical doctrines especially that Galileo and the other founders of modern mechanics and astronomy had to contend.

Good English translations of A.'s writings are: *Nicomachean Ethics,* by Welldon (N. Y. and London 1892); *Politics,* by Welldon (Cambridge 1888), by Jewett (Oxford 1885–88); *Poetics,* by Wharton (Cambridge 1883); *Rhetoric,* by Welldon (N. Y. and London 1886). On A. consult Zeller, *Aristotle and the Earlier Peripatetics.*

ARITHMETIC, n. *ă-rĭth′mĕ-tĭk* [Gr. *arithmēt′ĭkē:* L. *arithmēt′ĭca,* arithmetic—from Gr. *arith′mos,* number: F. *arithmétique*]: the science of numbers; the art of counting or computing. ARITHMETICAL, a. *ăr′ĭth-mĕt′ĭ-kăl,* pertaining to arithmetic. AR′ITHMET′ICALLY, ad. *-kăl-ĭ.* ARITHMETICIAN; n. *ă-rĭth′mĕ-tĭsh′ăn,* one skilled in arithmetic. ARITHMANCY, n. *ăr′ĭth-măn′sĭ* [Gr. *mantei′a,* divination]: divination by numbers. AR′ITHMOM′ETER, n. *-ĕtėr* [Gr. *metron,* a measure]: an abacus.

ARITHMETIC: the science that treats of numbers. The oldest deciphered writings on the subject are contained in the papyrus of Ahmes (between 1700 and 2000 B.C.), whose materials were probably derived from Babylonian sources. The most important advances made by the Greeks are found in the works of Euclid (Books 7–10 of the *Elements*) and Archimedes. A. made very slow progress among the ancients, owing to their clumsy modes of notation. Our so-called Arabic numerals are derived from

the Hindus, who probably also invented the zero (300 A.D.), thus making possible the positional system now in use, in which the *place* of a digit indicates whether it stands for units, tens, etc. The Hindu numerals, transmitted through the Arabs, made their way into Italy about 1200 B.C. Their sway increased gradually for the next three centuries, and with the invention of printing they finally secured a firm foothold throughout Europe. Over three hundred arithmetics printed before 1601 are still extant in the Plimpton collection.

The Babylonian priests developed considerable skill in computation, in connection with the working out of their astronomical observations. Besides the decimal system they, and the Egyptians also, use a system based on the number 60. Greek arithmetic was developed into a real science by the philosophers, largely in connection with geometry. The A. of the Romans, on the other hand, had a purely practical aim. In mediaeval Europe all calculations were performed by means of the abacus or reckoning board, down to the 12th century, when a complete revolution set in with the introduction of the algorism or Hindu method of arranging and carrying out the work. The church schools cultivated A. with special reference to the computation of the date of Easter. Commercial schools founded by the Hanseatic League did much more for the practical side of the science. A., as we know it today, dates from the beginning of the Renaissance, toward the end of the 15th century, when all learning received a new impulse.

The Ahmes papyrus contains many examples dealing with common fractions, especially those with unit numerators. Decimal fractions were invented about 1600, but did not come into use in the schools until about 1750. The arithmetical signs (q.v.) $+$, $-$, $\times$, $\div$, etc., secured recognition about 1550-1650; before that time the several operations were expressed by written words or abbreviations. The methods of multiplication and division have been greatly simplified in the last three centuries and changes are still going on in the elementary operations. One of the greatest advances in A. was the invention of Logarithms by Napier (1614).

The Greeks sharply divided the science into Logistic, being the art of computation, and Arithmetic, or theory of numbers. A similar distinction may be drawn today. The practical side is well treated in the school textbooks, which are confining themselves more and more to the essentials, discarding such topics as duodecimals, alligation, compound proportion, obsolescent systems of weights and measures, and other matters better treated by algebra, as the progressions, cube root, etc. At the same time the dividing line between A. and algebra is being obliterated with the introduction of simple algebraic equations into the better school arithmetics. Modern theoretical arithmetic includes not only the theory of numbers (integers), vastly enlarged by Fermat, Gauss, and

others, but also that of irrational and continuous number systems. In the latter direction great advances were made in the latter part of the 19th century by Weierstrass, Cantor, and Dedekind, to whom we owe the first logical theory of continuous number as used in the Calculus and Theory of Functions. See titles, DECIMALS, FRACTIONS, NUMERALS, PROPORTION, LOGARITHMS, etc.

ARITHMETICAL COMPLEMENT: that which a number wants to make it reach the next higher decimal denomination. Thus the A. C. of 4 is 6, for $4+6=10$, and that of 642 is 358, because $642+358=1{,}000$. The A. C. of a logarithm is what it wants to make it reach 10.

ARITHMETICAL MEAN: that number that lies half-way between two others; it is found by taking half their sum. Thus the A. M. of 11 and 17 is 14; the A. M. of —8 and 5 is $-1\frac{1}{2}$.

ARITHMETICAL PROGRESSION: a series of numbers having a common difference between any two successive ones; for example, 7, 10, 13, 16, 19, 22, or 12, $10\frac{1}{2}$, 9, $7\frac{1}{2}$, 6, or 5, 2, —1, —4, —7. The natural numbers 1, 2, 3, 4, . . . form an A. P. with the common difference 1. To find the sum of an arithmetical progression, add the first and last terms together and multiply the result by one-half the number of terms; thus the sum of the series 2, 4, 6, . . ., 20, 22, 24, 26 is $13\ (2+26)\div 2=182$.

ARITHMETICAL SIGNS: certain conventional marks or symbols used to indicate elementary operations to be performed on numbers or algebraic expressions. Thus $7+5$ indicates that 7 and 5 are to be *added* together; 7—5 that 5 is to be *subtracted* from 7; 7×5 that 7 and 5 are to be multiplied together; $7\div 5$ that 7 is to be divided by 5. The *exponent* 5 in 7^5 indicates that 7 is to be raised to the fifth *power*, i. e., $7^5=7\times 7\times 7\times 7\times 7$. The sign = indicates *equality*, as in $6+8=5+9$. The sign $\surd$ indicates *square root*, thus $\surd\overline{16}=4$; *cube root* is denoted by $\sqrt[3]{}$, fourth root by $\sqrt[4]{}$, etc. Roots are also denoted by fractional exponents, thus $5^{\frac{1}{2}}$ denotes $\surd 5$, $8^{\frac{2}{3}}$ the square of the cube root of 8, viz., 4, etc. *Ratio* is denoted by :, thus $a:b$ signifies the ratio of a to b, or $\frac{a}{b}$. The *proportion* $a:b::c:d$ indicates that the ratios $a:b$ and $c:d$ are equal. *Parentheses* ( ), *brackets* [ ], and *braces* { } indicate that the enclosed expressions are to be treated as a single number, thus $2(5-3)$ signifies 2 times the number 5—3, or $2\times 2=4$. The signs $>$ and $<$ signify 'greater than' and 'less than,' thus $10>6$, $8<12$.

All these signs are used both in arithmetic and in algebra. They came into use in the 16th and early 17th century. The decimal point dates from the same period. The symbol $\surd$ is a distorted *r* (the first letter of radix = root). The signs passed from algebra into arithmetic in the 18th century; but some of them, as + and —, had been used in merchants' accounts at a much earlier date.

ARIUS: *a-rĭ'us*, or *ā'rĭ-ŭs:* the celebrated founder of Arianism; b. Libya; and as is supposed shortly after the middle of the 3d c. About 306, Alexandria was thrown into confusion by the violence of its religious disputes, and in these A. was largely active. At first, he took part with Meletius, Bishop of Lycopolis, in Upper Egypt, a man who was strenuously opposed to certain notions of discipline entertained by Peter, Bishop of Alexandria; but afterwards he become reconciled to the latter, who made A. a deacon. The reconciliation, however, was brief. A. once more took the part of Meletius, and was excommunicated by Peter in consequence; but the latter dying soon after, Achillas, his successor, restored A. to his office, and even advanced him to the dignity of presbyter, 313. His new function required that he should interpret the Scriptures, and as he possessed an abundance of natural gifts, united with great learning, his preaching became popular, and his peculiarities of opinion were vehemently embraced. The first time, however, that A. was brought into collision on a point of doctrine with his ecclesiastical superiors was in 318. Alexander, Bishop of Alexandria, successor of Achillas, having in a public assembly of clergy, while speaking of the Trinity, said that it contained one single essence, or indivisible unity of substance, A. alleged that such a conception was impossible to the human mind, and accused Alexander of Sabellianism—i. e., of destroying the distinction of persons. The dispute grew hot, and a conference which was held to settle it only embittered the disputants. In maintaining his ground, A. went beyond his first statement of the absolute distinctness of person between the Father and the Son; he maintained that the Son was not co-equal or co-eternal with the Father, but only the first and highest of all finite beings, created out of nothing by an act of God's free will, and that he ought not to be ranked with the Father.

A. was successful in securing the adherence of large numbers both of the clergy and laity in Egypt, Syria, and Asia Minor. In 321, a synod of bishops was held at Alexandria. These deposed and excommunicated A., and active measures were taken to let this decision be known over all the Christian churches; Alexander himself wrote numerous letters (two of which are still extant), exhorting the bishops not to receive the 'heretic.' In consequence of these violent steps, the breach was widened. To escape persecution, A. retired to Palestine, where he wrote a letter to his friend Eusebius, who was Bishop of Nicomedeia, a city of Bithynia, and not far from Constantinople. Eusebius, one of the most influential Christians of his time, warmly sympathized with him; wrote in his behalf to Paulinus, Bishop of Tyre, and others; absolved him from the Alexandrian synod's excommunication; and in 323 convened another synod in Bithynia, which pronounced favorably on A. He even enlisted Constantine on the side of the latter, to this extent at least, that the half-pagan emperor addressed ad

monitions to both Alexander and A., assuring them that the point in dispute was a trifling one, and ought not to provoke a serious quarrel. While A. was residing at Nicomedeia, he wrote a theological work in verse and prose, called *Thaleia*, some fragments of which remain, and indicate an earnest and philosophic mind, but contain expressions which could not but pain a believer in the proper divinity of Christ. The *Thaleia* is said to have been sung by the Arian neophytes, who thus kindled the passions of their adversaries, and increased the virulence of the contest. The comedians, who were pagans, took advantage of the occasion to ridicule the Christian religion in the theatres. The officers of the emperor in several cities wished to repress this profane temerity, but the interference only created greater confusion.

It now became impossible for the emperor to remain neutral or indifferent, with safety to himself or to the tranquillity of the empire. Hosius, Bishop of Corduba, whom he had appointed mediator betwixt Alexander and A., took part with the former, and reported unfavorably of A. The result was, that Constantine, in order, as he thought, to effect a final settlement of the question, convoked the memorable Council of Nicæa (Nice, q.v.), in Bithynia, 325. Three hundred and eighteen bishops from almost all the Christian world, especially from the East, were present, besides numbers of priests, deacons, and acolytes. A. boldly expounded and defended his opinions. He declared in the most unambiguous manner that the Son of God was created out of nothing; that he had not always existed; that he was not immutable or impeccable; that it was through his free-will he remained good and holy; that if he had chosen, he could as easily have sinned as not; in a word, that he was a mere creature and work of the Deity. He further affirmed that the Son of God was not of the same substance, with the Father; that he was not the 'Word' or 'Wisdom,' properly speaking; and that the Scriptures only attribute these names to him as they do to other created intelligences. These propositions were listened to with great calmness by the bishops, but the inferior clergy, or at least a majority of them, manifested the most violent opposition. The document containing his confession of faith was torn to pieces before his face. Arguments, however, of a more rational kind were also employed. Alexander was ably seconded by the young deacon, Athanasius, the equal of A. in eloquence, and in the power of his logic. It was principally by the reasonings of Athanasius that the council was persuaded to define, in the most precise manner, as the doctrine of the Godhead, the absolute unity of the divine essence, and the absolute equality of the three persons. All the bishops subscribed it except two, Theonas of Marmarica and Secundus of Ptolemais, who had the heroism (for it must be considered such) to follow the banished A. into Illyricum.

An imperial edict was now issued commanding the writings of A. to be burned, and threatening with capital punish

ment all who should be convicted of concealing them. This change in the emperor's sentiments as to the importance of the doctrine at issue is attributed by some writers to his recognizing the will of Heaven in the harmonious consent of so many bishops. A more probable explanation is, that he anticipated the utmost social confusion from the collision of opinion, and resolved to crush that which was at once the youngest and the weakest, hoping thereby to remove the ground of disturbance. He misjudged, however. At Alexandria, the Arians continued in a state of open insurrection, and began to league themselves with other condemned sects, for mutual defense. The great influence of Eusebius was also exerted on behalf of the exiled heretic, as well as that of Constantia, the sister of the emperor, who had herself embraced Arian tenets, and in 328 permission was granted him to return from Illyricum. Constantine was very gracious, perhaps because he thought the chances of peace being restored to the community were now greater, for it had been represented to him by Eusebius that the doctrines of A. did not essentially differ from those of the Nicene Council. In 330, A. had an interview with the emperor, and succeeded in convincing him that Eusebius had spoken the truth. In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that as the 'Word,' he had made all things both in heaven and earth. The emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive A. into the communion of the church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius was greatly irritated. He called a synod of bishops at Tyre, 335, which proceeded to depose Athanasius. The emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason, that he wished to deliver him from the machinations of his enemies. In the same year, another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, Arius in 336 proceeded to Constantinople, where he presented the emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was considered a grand triumph by Eusebius and his friends, and when the day arrived, they escorted A., as a guard of honor, through the streets of the metropolis. When about to enter the temple, in which it was intended that he should be received with solemn pomp, he retired a moment to relieve nature, but fainted, and died of a violent hemorrhage. His disciples declared that he had been poisoned, while the orthodox devoutly affirmed that God had answered the prayers of Alexander.

ARIZONA.

ARIZONA, *ăr-ĭ-zō'nă:* one of the territories of the United States, in the s.w. part, separated from the Pacific by s. California and by the rocky and arid desert of Lower California. It lies between the parallels of 31° 20′ and 37° n. and the meridians of 109° and 114° 35′ w. Its latest computed area according to land office reports is 113,916 sq. m., or 72,906,240 acres. It has been only partially surveyed, however, and its area is believed to be much greater than this, roughly computed at about that of New England, New York, and New Jersey. A. is bounded on the n. by Utah, the 37th parallel forming its n. boundary as far w. as the 114th meridian. From the 36th parallel s., the w. boundary is irregular, following the course of the Colorado river. The s. boundary runs w. along the parallel of 31° 20′ to the 111th meridian, and then n.w. to 32° 30′, where it strikes the Colorado. A. is bounded on the e. by New Mexico. A. occupies a large part of the plateau region, the s. continuation of the Great Basin mountain ranges, and a portion of the group of ranges of which those on the s. coast of California are members. The prevalent character of the surface is arid, and in the s.w. portion are large tracts of shifting sands. The highest known mountain elevation is Mount San Francisco, at the northernmost end of the plateau of that name, and whose summit is 12,700 ft. above the level of the sea. But although the general appearance of the surface of the country is mountainous and forbidding, the variety being desert spaces, *mesas*, or table lands, void of water, yet there are many valleys of great natural beauty and fertility; the valleys of the Colorado Chiquito and Rio Salinas being true garden-spots, while in the surrounding mountains are excellent stock-ranges, with fine grazing and plenty of water. Even the table-lands, when properly irrigated, prove wonderfully productive, yielding 65 bush. of wheat of fine quality to the acre, and producing Indian corn and root-crops in enormous quantities. The water-ways of A. are the Colorado and Gila rivers, with their tributaries. Here the bottom-lands are fertile, but the valley below the cañons is barren and unproductive. The n. section of the territory is well wooded and fertile, the grass is inexhaustible, and water is accessible; here, too, are the invaluable mining districts. S.e. Arizona lacks both water and timber. The n.w. portion is well timbered with juniper and pine, and there are numerous large springs and lakes. The face of the country in the extreme n.e. presents a succession of mountain ranges and valleys, the hills being covered with forests of yellow pine. Here, however, as in so many parts of A., is great scarcity of water. The most remarkable feature of the topography of this territory is the tendency of its rivers and streams to form cañons of vast depth with precipitous sides. It seems as though these waters had been endowed with a force elsewhere unknown, to enable them to cut their way to the Gulf of California through such gigantic mountainous masses of rock. The entire territory is drained by the Colorado and its tributaries, with the result of the arid condition of the interior. Many of these tribu-

taries are themselves considerable streams, rushing each through its own gloomy and cavernous cañons; but the majestic Colorado is the monarch of them all. This tremendous and swift river, increased by the waters of nearly 200 streams, large and small, covers a descent of more than 3 000 ft. in 600 m. The Great Cañon of the Colorado is one of the natural wonders of the world, whose secrets were never disclosed until the memorable and fatal expeditions of Maj. J. W. Powell, 1869 and 1871, made them known to the world. Through its whole course there is a succession of cañons, which give this river an aspect possessed by no other in the world. At irregular intervals the rapid current plunges down steep declivities a distance of from 75 to 350 ft. The walls of the Grand Cañon are at some points more than a mile in height, dark gorges where the sun never penetrates except for a few moments at high noon. The vast, frowning masses of rock display the most wonderful freaks of nature, being battlemented, scarped, castellated, and pinnacled, after a fashion most grand and impressive. From the termination of the Grand Cañon the Colorado is navigable, though with difficulty, owing to the numerous rapids, to its mouth, a distance of 612 m. The deep cañons of the principal rivers render enormous tracts of land unfit for anything except grazing, and even that with difficulty, owing to the extreme scarcity of water at any distance inland.

Geology.—The exploration of the geological and mineralogical conditions of A. have been confined mainly to the portion of the territory just described. It is estimated that the Colorado river has cut through strata representing a thickness of 25,000 ft., nearly five m. of vertical height, exposing in its course every geological formation found in North America, from the quaternary alluvial deposits to the primary azoic rocks, with intervals showing the alterations effected by volcanic action. About 16,000 ft. of these strata are in A., displaying the superficial deposits, alluvium, possibly diluvium, clay, and sandstone detritus, etc. In the n.e. part of the territory are coal-beds, anthracite, and excellent in quality. There are also marbles and sandstones of all colors, granites, and other valuable building-stones. The mineral wealth of A. is great, in veins and placers of gold, silver, copper, and lead, and carbonates and oxides of iron, platinum, and quicksilver, widely distributed. Gold is found free in both placers and quartz lodes; silver in galena, and combined with lead, and copper as sulphides and carbonates; copper is found in the form of gray sulphurets; quicksilver in the form of cinnabar and possibly other combinations; tin, platinum, and nickel, nearly pure; iron ores of all kinds, and well situated for producing the finer qualities of iron and steel. Besides the anthracite coal in the n.e., there is bituminous coal adapted to smelting purposes, at Camp Apache and elsewhere. Immense deposits of salt of the purest quality have been found, and there are large beds of sulphur, gypsum, hydraulic lime, valuable mineral springs, natural lodestones of great magnetic power, and fossil woods of many varieties. There are also opal

Area in Square Miles, 112,920.
Number of Counties, 13.
Population, 122,931.
Capital of State, Phoenix.
ARIZONA
SCALE OF MILES
0 20 40 60 80
Longitude 112° West from Greenwich 110°
BORMAY ENGRAVING CO., N.Y.
Pine Valley
Glendale
St. George
Kanab
Bluff
Littlefield
Fredonia
Lees Ferry
Moapa
St. Thomas
Virgin River
Colorado River
San Juan River
Marble Canon
Little Colorado River
Grand Canon of the Colorado
HUALPAI INDIAN RES.
NAVAJO INDIAN RESERVATION
MOQUI INDIAN RES.
Carriso Mts.
Squash Mts.
Chin Lee
Tuba
Supai
Grand Canyon
Coconino
Apex
Anita
Grandview
Algert
Oraibi
Keams Canyon
Polacca
Toreva
Ft. Defiance
Ganada
Saint Michaels
Willaha
Valle
Prado
Red Lake
Tolchaco
Williams
Ashfork
Chaleender
Bellemont
Flagstaff
Cosnino
Angell
Canon Diablo
Allantown
Querino
Chambers
Pinta
White Hills
Cherokee
Peach Springs
Nelson
Yampai
Aubrey
Truxton
Chloride
Antares
Mineral
Corbat
Hackberry
Hualapai
Union
Kingman
McConnico
Goldroad
Drake
Chino
Pan
Prescott
Meath
Rock Butte
Woodside
Dennison
Winslow
Manila
Bibo
Adamana
Holbrook
Carrizo
Hobson
Penzance
Woodruff
Juniper
Valley
Gorman
Babbitts
Needles
Kaster
Signal
Yucca
Beal
Franconia
Cedar
Owens
Kynd
Jerome Jc.
Jerome
Sedonia
Summit
Cornville
Aultman
Campverde
Simmons
Granite
Sultan
P & E. Jc.
Iron Spgs.
Skull Valley
Kirkland
Humboldt
Poland
Poland Jc.
Strawberry
Heber
Snowflake
Concho
Taylor
Shumway
St. Johns
Tule
Signal
Grandview
Hillside
Date Cr.
Providence
Mayer
Pine
Payson
Pinedale
Showlow
Richville
Springville
Greer
Eager
Nutrioso
Planet
Parker
Wagoner
Turkey
Briggs
Rye
Gisela
Young
Ellison
Pinetop
Congress
Congress Jc.
Columbia
Hot Springs
Canon
Diake
Hot Springs Jc.
Nada
Cavercreek
Cline
Whiteriver
White Mts.
Alpine
Salome
Beardsley
Marinette
Glendale
Scottsdale
Salt River
Apache Mts.
INDIAN RESERVATION
Blue
Ehrenburg
Quartzsite
Granite Wash Mts.
Dome Rock Mts.
Coldwater
Arlington
Tempe
Lehi
Mesa
Higley
Kyrene
Queen
Webster
Cochran
Troy
Globe
Rice Sta.
San Carlos
Ray
Cutter
Dewey
Benton
Metcalf
Clifton
Morenci
Geronimo
Ft. Thomas
Thatcher
Safford
Sheldon
Duncan
Cibola
Chocolate Mts.
Big Horn Mts.
Gila River
Buchanan
Kofa
Agua Caliente
Estrella
Sta. Gila
Zellweger
Winkelman
Gila
Aravaipa
Matthews
Pima
Bonita
Cedar
Dunlap
Mammoth Spgs.
Rail N.
Ranch
20 Mile
Tank
Yuma
Palomas
Mohawk
Gila R.
Theba
Smurr
Gilabend
Bosque
Enid
Maricopa
Liriza
Ban
Vunez
Arizola
Dudleyville
Toltec
Picacho
Wymola
Redrock
Shultz
Ft. Grant
Ranch
Balleys Well
Tevistop
Olga
Yuma
Concerton
Adonde
Colfred
Pemlroke
Aztec
Kimball
Mesquite
Stanwix
Sentinel
Tartron
Friedra
Lumas
Negras
Sierra de la Cabeza Prieta
Range
Vekol
Silverbell
Marana
Cortaro
Jaynes
Redington
Pool
Dury
Alrich
Willcox
Fort Bowie
Dos Cabezos
Brownell
Quijotoa
Stockham
Tucson
Rankin
Palvo
Johnson
Echo
Cochise
Dragoon
Paradise
Papago Ind. Res.
Vail
S. Irene
Kadakon
Benson
Ochoa
Pearce
Visnaga
Black Diamond
Santo Domingo
Santa Catalina Mts.
Canistea Sta.
Contention
Gleeson
Apache
Sonoita
Brookline
Crittenden
Patagonia
Elgin
Tombstone
Charleston
Arizmo
Cobota
Blanton
Lewis Spgs.
Bisbee
Tufa
French
College Peak
Calabasas
Ft. Huachuca
Palmerlee
Pozo Verde
Nogales
Duquesne
Hereford
Douglas
Naco
Lochiel
Agua Caliente
Encina
Agua Zarra
Santa Cruz
Presidio off
San Pedro
San Jose
Mesa
Del Rio
Tuxicachi
Cabullona
Fronteras
Basura
San Hilario
Cibuta
Quijano
Cumeval
Plerson
Santa Ana
Llano
Altar
R. del Altar
Nacozari
Cos
Ramos
Mexico

pebbles; garnets, red, white, and yellow; azurite, malachite, chalcedony, sapphires, opals, and possibly some diamonds. The plains appear to be altogether of quaternary and tertiary deposits. In the Colorado valley the sedimentary strata consists of quaternary and tertiary gravels and conglomerates, varied in a few localities with white infusorial earth. The bottom-lands consist of calcareous sands and clays. A section of the Grand Cañor shows the following order: Upper carboniferous limestone; cross-stratified sandstone; red calcareous sandstone with gypsum; lower carboniferous limestone; limestones, shales and grits—Devonian; limestones, mud rocks, and sandstones—Silurian; Potsdam sandstone, granite.

Botany.—The vegetation of s. and w. A. is scanty, limited to a few genera, such as cactus, aloe, artemisia, iron-wood, and mesquite. In the middle and n.e. the vegetation is more generous, including rich grasses, pine, and cedar forests; and in the river-bottoms ash, walnut, cherry, willow, cottonwood, and on some of the mountains oak. Wherever the land can be irrigated, it is found that a full growth may be obtained of Indian corn, wheat, barley, oats, grapes, figs, oranges, lemons, sweet potatoes, tomatoes, tobacco, and the castor-bean. In the valleys of middle and e. Arizona there are broad sections of arable land, where all the cereals and root-crops of the n. Atlantic states can be grown, while this region is unsurpassed as grazing land; a thick growth of gramma and bunch grass extends all over it.—The climate of A. varies in the different parts. In the central portion snow falls but does not lie. In s. A. the temperature ranges between 34° and 118° F. The atmosphere is dry, and this region is not subject to malarial disorders; the average rainfall is between 3 and 8 inches. The climate of A. is recommended by physicians as beneficial to constitutions impoverished by bronchial or lung diseases. The temperature in summer rarely exceeds 90°, and in winter generally remains above zero. The largest quantity of rain falls in July and August.

Zoology.—Wild animals are not numerous in A. There are two species of deer, the Rocky Mountain antelope, the bighorn, or mountain sheep, and the Rocky Mountain goat. The black and cinnamon bears are somewhat numerous; the puma or cougar is found in the forests, and the jaguar in the lowlands; there are also occasional instances of the finding of the ocelot, the wild-cat, and the lynx, as well as the gray wolf, and one or two species of fox; the prairie wolf, or coyote, does not exist in the territory, but there are peccaries, raccoons, opossum, skunks, and the gopher, or prairie-dog. Large herds of mustangs, or wild horses, are said to roam over the plains of s. A. There are large numbers of birds, 183 distinct species having been sent to the Smithsonian Institution by the Wheeler expedition. Game birds include pheasants, partridges, quails, and grouse, the sage-hen, and prairie-hen. Eagles, vultures, buzzards, and owls are numerous, and here is found—the only place in North America—the king vulture, little inferior in size to the condor, or lam-

mergeier of the Andes. There are many varieties of fish, some of them peculiar to the territory. The reptiles and serpents are formidable, and in some parts very numerous. In the Gila, and Lower Colorado, alligators are found; horned toads, lizards, scorpions, and centipedes flourish in the chapparal and among the cacti; and the tablelands offer a home to large numbers of rattlesnakes. Strangely the skunk is here found dangerous, from its carnivorous propensities, attacking the exposed limbs and features of sleepers, the bite being not only savage, but said to produce a condition similar to hydrophobia.

Agriculture.—Of the 72,332,800 acres in the territory a large portion is made up of public or reservation lands, while only comparatively few acres are under cultivation. The valley lands, however, are marvelously rich, while a vast area which was previously deemed waste land is being reclaimed by means of irrigation. Through this means the entire territory promises to become of great agricultural valuc. The staple crops are alfalfa, barley, wheat, sorghum, kaffir corn, root crops, sugar beets, green vegetables, and small fruits of every variety, together with almonds, olives, etc. Experiments have also been made in growing dates and Egyptian cotton, while the constant experiments of the agricultural experiment station, with its headquarters at the Territory University, lends considerable impetus to all forms of agriculture. The mountains and mesas of the northern part of A., which are generally covered with nutritious grasses, form excellent pasture land for sheep and cattle, while irrigated pastures in the south afford means for fattening for market. Of the latter, together with swine, there are nearly 2,000,000 head in the territory, valued at $16,000,000. Ostrich farming is also profitable in the territory, there being more than 1,500 birds.

Mining.—Gold and silver mining were prosecuted long before Arizona was acquired by the United States. Some of the mines, such as the Cerro Colorado, Mowry, Santa Rita, Salero, Cahubi, San Pedro, and the celebrated quicksilver mine of La Paz, are exceedingly productive. The most numerous mining districts lie in the southeastern part of the territory. Copper, gold, and silver form the most profitable mining products, but there are also deposits of coal, lead, fluorspar, mica, nickel, limestone, marble, granite, onyx, and sandstone, all of which promise to become very profitable when more extensively developed.

Railroads.—There are more than 2,000 miles of steam road in the territory, the principal lines being the Santa Fé and Southern Pacific.

Commerce.—The approximate total value of all foreign commodities imported into A. averages more than

entire revenue of the district being derived from the duty on lead and copper contained in silver ore imported from Mexico.

Education.—The common-school system is firmly established on a carefully constructed code. The school age, which was formerly from 6 to 24 years, is now from 6 to 21, and all children between those ages, excepting Chinese and the children of Indians not taxed, are entitled to admission and free education; if unable to procure text-books these are furnished them by the district. Each district, under recent laws, must maintain a school for five months each year, to secure its proportion of the county appropriations. The general school fund is derived from a direct tax on all property in each county at a minimum rate of 75 cents per $100 of assessed property; also from per capita taxes, license fees, fines, forfeitures, penalties, etc.; and the fund is apportioned for the use of the districts according to the number of children therein, as ascertained by annual census. The school buildings are ample, comfortable, and adequately furnished. Fully one-third of the children of school age are enrolled in the public schools, and about one-half attend for at least a portion of the year. The grammar school course is so graded that its completion meets the requirements for admission to the normal school at Temple, which, with the University of A., provides a complete system of public school education.

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Archæology.—Evidences exist all over A. that a very large population once occupied this part of America. Ruins of extensive buildings and large towns can be found

in every valley of southern A., and ancient waterways line every agricultural section. Modern irrigators have surveyed ancient canals and found them to run under eruptive lava. Authorities differ as to the cause of the extermination of the cliff and cave dwellers and the residents of the once populous communities—whether by earthquake, epidemic, or warfare; but there are everywhere evidences of a hasty departure of former occupants, and there is much similarity between the pottery and utensils of the present natives and those of the people who are gone. The oldest Indians living say that their traditions tell them that these ruins were there when their people came. It is interesting to note that the general govt. has taken steps to preserve some of the most notable ruins, especially those of Casa Grande; and Gov. Murphy urged (1892) the appointment by the govt. of an ethnological commission, believing that startling discoveries can and will be made in that region affecting the history of the human race. It is interesting to note that a party of Mexican laborers, digging in the extension of the Santa Cruz canal in 1892, Mar., discovered one of the strangest of the old Aztec cities, about 20 ft. below the surface of the ground. The largest building was a triangular structure 300x200 ft., and in it were 18 bodies, all of medium size, and mummified. The territorial exhibit at the Columbian World's Exposition included the largest relief map ever made, showing in detail all the pre-historic views of the valleys of the Salt and Gila rivers, and giving a bird's-eye view of nearly 1,000 sq. m., which it is estimated once supported a population of 2,000,000 to 3,000,000 people who have passed into oblivion without leaving a tradition as to whence they came, or when and why they disappeared. This map was prepared under the direction of Prof. F. W. Putnam, of Harvard University.

Finances.—The last Territorial report of the Governor showed the total revenues for the year to be $1,121,381.48, as against total expenditures of $976,-103.74. The total bonded indebtedness was $3,055,-275.29; assessed taxable property $86,126,226.35.

History.—The first modern exploration of A. known to history was by the Spaniards. As early as 1526, Don José de Vasconcellos crossed it in the direction of the Grand Cañon, and later it was visited by other Spanish explorers, evidences of whose settlements are still found. But long before this A. is known to have been the seat of an extensive and civilized race, whose remains exist on the Colorado plateau and in the Gila basin, comprising the walls of considerable structures, built of solid masonry, quantities of finely made and ornamented pottery, ruins of carefully constructed fortifications, evidences sufficient to give basis for the estimate that at least 100,000 people occupied the valley of the Gila alone. Ruins of old arastras, or smelting works, show that silver mining was practiced by the ancient races, and occasionally the bones of human beings are brought to light, surrounded by the implements

SAN FRANCISCO MOUNTAINS, ARIZONA.

and appurtenances of domestic life. That the Moquis are descendants of one of these ancient races is assumed from their dwellings, some of which date back in their construction to a high antiquity. The Moquis live in the n.e. part of the territory, in the ancient province of Tusayan. They are pagans by religion, and many of their prayers and invocations indicate conditions of the highest antiquity. Their dwellings are of stone usually placed on some elevation, and three or four stories in height. There are more than 60 towns discoverable, of buildings of this character, only seven or eight of which are now occupied. Among the first white men to enter Arizona were probably Juan de la Asuncion and Pedro Nadal, two friars of whom little is known, who penetrated the region in 1538. Fray Marcos of Niza and his negro companion Estevanico, in 1539, journeyed from Mexico to the sources of the Rio San Pedro, thence across the southeastern part of the present Territory to the Province of Cibola. In the following year Niza served as guide to Francisco Vasquez Coronado, who, with a considerable force, visited Cibola and sent two small expeditions which discovered the Hopi villages (called Tusayan) and the Grand Cañon of the Colorado. Meanwhile other parties went from the settlement which Coronado established on the Rio Sonora, northwestern Mexico, explored the region, later known as the Papagueria (from the Papago Indians), to the mouth of the Colorado. Antonio de Espejo visited the Hopi villages in the northeastern part in 1583, as did Juan de Oñate, the first governor and colonizer of New Mexico, in 1598, the latter also passing entirely across the Territory to the mouth of the Colorado and back in 1604–5. The first missions were established among the Hopis by Franciscans in the summer of 1629, which were successfully continued until Aug. 1680, when, in a general uprising of the Pueblos, the missionaries were murdered and little effort made thenceforth to introduce Christianity. From 1687 the Jesuits, particularly Padre Eusebio Kino, made various journeys into southern Arizona, establishing the missions of San Xavier del Bac in 1699 or 1700, and that of Guevavi in 1732. In 1752 a presidio was established at Tubac, but in 1776 it was removed to a rancheria of about 80 families of Pima, Papago, and Sobaipuri Indians, known as San Agustin de Tucson (the present Tucson) a few miles northward, at which a few Spaniards may also have settled after 1763. The Jesuits were expelled in 1767 and were followed by Franciscans, who rehabilitated the mission settlements and conducted explorations in unknown or forgotten regions. The history of A. as a territory of the United States begins in 1848, when, by the treaty of Guadalupe Hidalgo, the territory of New Mexico was ceded by the Mexicans to this country, including that portion of A. lying n. of the Gila river. The portion lying s. of that river was acquired 1853, Dec. 30, by what is known as the "Gadsden purchase" from Mexico, for

$10,000,000, of which most is non-dutiable. The revenue collections aggregate about $130,000, almost the $10,000,000. An act of congress passed 1863, Feb. 24, gave this land a political status as the territory of A.

In accordance with the terms of a bill signed by the President on June 16, 1906, the territories of Arizona and New Mexico were to be admitted to the Union, but at the subsequent election the efforts toward statehood failed through an adverse vote. Later congress refused to approve the new constitution.

Government.—The executive authority, according to acts of congress under which all the territories were organized, is vested in a gov., appointed by the pres. for a term of 4 years, salary $3,500 per annum; the legislative in a legislature comprising (1893) a council of 12 members and a house of 24, all members elected by the people; and the judicial in a supreme court consisting of a chief-justice and three assoc. justices, appointed by the pres., a dist. court, and the usual court officers. The gov. is assisted by a territorial sec., treas., auditor, adjt.gen., supt. of public instruction, and atty.gen.—The successive govs., with their terms of service, are as follows: John A. Gurley, 1862–3; John N. Goodwin 1863–66; Richard C. McCormick 1866-69; A. P. K. Safford 1869–76; Charles E. D. French 1876–7; John P. Hoyt 1877–8; John C. Fremont 1878–82; Frederick A. Tritle 1882–85; C. Meyer Zulick 1885–89; Louis Wolfley 1889–91; John N. Irwin 1891–2; Nathan O. Murphy, 1892–4; Louis C. Hughes 1894–6; Benjamin J. Franklin 1896–7; Myron H. McCord, 1897–9; Nathan O. Murphy, 1899–1902; Alex. O. Brodie, 1902–6, Joseph H. Kibbey, 1906-09; 1909, Richard E. Sloan.

Population.—(1900) 122,212; (1910) 204,354. Cap. Phœnix; largest cities Tucson, Phœnix and Prescott.

ARK, n. *ârk* [AS. *eark:* L. Sp. and It. *arca*, a chest]: among the *anc. Jews*, an oblong chest or case in which were deposited the two tables of the law, and over which was the mercy-seat; a chest; a vessel; the large vessel or floating structure that was a place of safety to Noah and his family at the Flood. It was 300 cubits long, 50 wide, and 80 high; but as we do not know the length of the cubit, this simply gives us its proportions. It probably had little resemblance to a ship, but was more like an oblong house. The A. of bulrushes, in which Moses was protected, was made of papyrus reeds and covered with slime to keep out the water. The word Ark is used figuratively for a place of shelter. See also ARK OF THE COVENANT. ARKITE, n. *âr'kīt*, one of the persons saved in the ark: ADJ. pertaining to the ark of Noah.

ARKADELPHIA, *ârk-ă-dĕl'fĭ-ă:* t. of Clark co., Arkansas, 65 m. s.w. of Little Rock, on the Ouachita river, and on the Arkansas division of the St. Louis, Iron Mountain & Southern r.r. It contains a Baptist college, a newspaper office, and several churches. Pop. 2,800.

ARKANSAS.

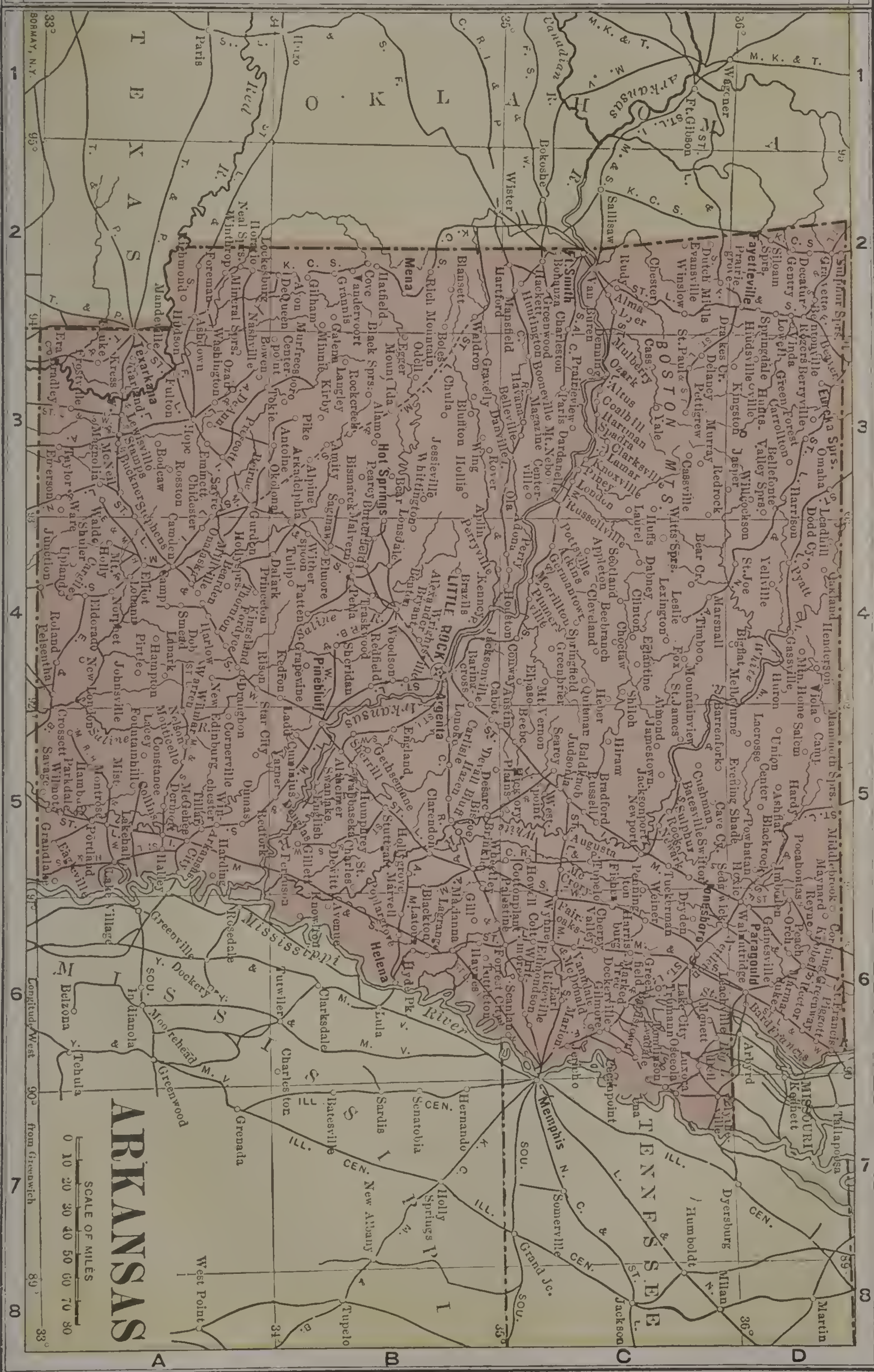
ARKANSAS, *âr'kan-saw* or *âr-kăn'săs:* one of the United States, in the s. central part: having the Missouri river on the n.; the Mississippi on the e., separating it from Tennessee and Mississippi; on the s. Louisiana and Texas; and on the w. Texas and Indian Territory; 53,850 sq. m., or 34,464,000 acres. The surface of A. is varied, the Ozark Mountains crossing it from n.e. to s.w., with outlying spurs, or subordinate ranges, including the Black Hills in the n., the Ouachita Hills in the s., and the Cane Hills in the n.w. To the s. are broad prairie districts, and the remainder of the state is diversified between hills and fertile and beautiful valleys. The entire state is rich in timber, including vast forests of pine, the different species of oak, pecan, hickory, locust, walnut, cypress, cedar, and others. Arkansas has no sea-coast, but it is remarkably well provided with navigable streams. The Mississippi river, which separates the state from Tennessee and Mississippi, extends along its whole eastern border—a tortuous course of nearly 400 m. Of this great stream, one of the largest affluents is the Arkansas river, which rises in the Rocky Mountains, traverses the centre of the state in a general s.w. direction, about 1,500 m., and is navigable from its mouth into the Indian Territory. The Red river, also navigable, rises in New Mexico and flows through the s.w. part of the state, to the great commercial advantage of Sevier, Lafayette, and Hempstead counties. In the Ozark Mountains of Missouri rises the St. Francis river, which is for a short distance the boundary between Missouri and Arkansas, and which runs into the Mississippi a little above Helena, crossing the n.e. corner of the state. This also is a large river, but its navigation is greatly impeded by snags. At one point the St. Francis widens into a lake, some 50 m. long, and from 5 to 20 m. wide, a phenomenon supposed to have resulted from a sinking of the earth caused by the great earthquake of 1811. The St. Francis is 450 m. long, navigable at certain seasons for a distance of about 150 miles. White river rises in the n.w. corner of the state, runs n. into Missouri, then returns and takes a crooked course in a generally s.e. direction through A., emptying into the Mississippi a few miles above the mouth of the Arkansas. This river is about 600 m. long, navigable from 300 to 400 m., according to the season. The Black river is a tributary, navigable about 100 m.; the Spring river is another less important affluent. The Wachita or Ouachita river rises s. of the Arkansas river in the w. part of the state, and runs s.e., parallel with that stream, fertilizing the richest portion of s. Arkansas, and then runs through a part of Louisiana, emptying into the Red river near the junction of the latter with the Mississippi. It is navigable for about 350 m. from its mouth, and has for tributaries the Little Missouri, Sabine, Saline, Bayou Bœuf, etc. In Pike county, on the Little Missouri, is a natural bridge, one of the curiosities of the state. It is an objectionable feature of the low river valleys of Arkansas, that they are deficient in springs, or any good, potable water. As a consequence, the river water itself is used for drinking and

culinary purposes, after being filtered, and rain water is collected and kept in large tanks sunk in the ground.

A line drawn across the state from s.w. to n.e., following that of the St. Louis, Iron Mountain and Southern railway, divides the upper mountainous, forest and mineral lands from the lowlands and alluvial plains. In the n. part are rich mineral deposits. Coal is known to exist in twelve counties watered by the Arkansas river, the mineral being a high-grade semi-anthracite, comparatively little worked, and supposed to cover an area of 12,000 sq. m., the veins varying between one foot and nine ft. in thickness, and from 50 to 60 ft. below the surface. There are also cannel and bituminous coals is abundance; iron ore of excellent quality is plentiful in the Ozark Mountains; zinc ore is more abundant than in any other state except New Jersey. Galena, or lead ore, frequently bearing silver, is found in different parts of the state; gold has been found in some sections, manganese is abundant, and it is believed that A. contains more gypsum than all the other states of the Union. Oil-stone of a superior quality exists in an immense bed in the Washita valley, and salt is produced from the saline springs in the same vicinity. The formation of the land along the banks of the Mississippi river, in the e. part of the state, presents a strip ranging from 30 to 100 m. wide, low and flat, covered with dense forests, interspersed with swamps and small ponds, sometimes of stagnant and unhealthy water. This land is annually overflowed at the recurrence of the floods of the Mississippi. From this section, westward, the land gradually rises, near the centre of the state becoming hilly, these hills terminating in the Ozark Mountains, still further west, beyond which an extensive elevated plain continually increases in height towards the Rocky Mountains, in which it terminates. The valley of the St. Francis river, in the n.e. part of the state, is a continuous swamp, filled with shallow lakes and bayous, and covered with a heavy growth of cypress, gum, and sycamore; on the higher land the growth is white-oak and hickory, with occasional thickly set cane-brakes. Besides the minerals already mentioned, A. has extensive beds of lignite, millstone, and grindstone, porcelain clay, mineral ochres, and granite and other building stones. Among the natural objects of curiosity and importance are the numerous mineral and medicinal springs, and the celebrated Hot Springs, about 60 m. s.w. from Little Rock, visited annually by thousands. These springs are strongly impregnated with carbonic acid, alkalies, and carbonates, and have a temperature varying between 93° and 148°; they are claimed to effect positive and permanent cure in the case of a number of chronic diseases. But the mineral springs are not confined to the 'Hot Springs' district. There are many in different parts of the state, and one in Fulton co. discharges 15,000 bbls. of water per hour, and is in constant action at a temperature of 60°.

The soil of A. of course varies with the varying characteristics of the geology and surface conditions. The river bottom lands are the most valuable in an agricultural

Area in Square Miles, 53,850. Population, 1,311,564.
Number of Counties, 75. Capital of State, Little Rock.



view, being capable of producing luxuriantly tobacco, corn, cotton, sweet potatoes, grapes, peaches, melons, and other fruits. As the land rises from these bottoms, it becomes less productive, but there are immense tracts submerged, which, if drained properly, would present the finest agricultural advantages. The rolling prairies of the uplands are generally well watered, though there is a notable exception in the case of Grand Prairie, 90 m. long and 30 broad, lying between the Arkansas and White rivers, almost entirely destitute of water. Besides the natural products already mentioned, there are the sassafras, maple, and mulberry among trees, the osage-orange, which grows luxuriantly, the beech, ash, elm, cotton-wood, willow, holly, butternut, juniper, plum, dog-wood, palmetto, laurel, ironwood, scrub oak, hazel, sumac, and others. There are also wild plums, haws, persimmons, pawpaws, whortleberries, and chinquapins. Among the fruits are apples, apricots, nectarines, cherries, strawberries, etc. Any of the cereals grow readily; there are numerous varieties of native grasses, and though cotton is the staple product of the state, the crop of hay is not far behind it in importance. Game abounds in the forests and prairies, including deer, bear, wild turkey, prairie hen, and quail; the streams abound in fish; there are few alligators; different species of snakes abound in certain sections. The climate of A., though generally temperate, is subject to fierce north winds which produce sudden and violent changes. The average mean temperature at Little Rock is 62° 66′, the extremes being 15° and 99°, with an occasional lower fall. The rain-fall is heavy, and violent thunder storms occur in the spring and summer.

Agriculture.—About 200,000 farms, comprising almost 18,000,000 acres, constitute the farm lands of the State. Together with buildings and improvements, implements, machinery, and live stock, the aggregate value of these is about $200,000,000. The chief crops are wheat, cotton, tobacco, hay, potatoes, oats, and corn. Raw and manufactured forest products are also exported, being worth approximately $30,000,000 a year, while apples, strawberries, peaches, and grapes also form valuable products. Roses and other flowers are extensively cultivated for perfume and seeds.

Manufactures.—Manufactures have increased from 261 in 1850 to almost 2,500 at the present time. The chief manufacturing industries are lumber and timber products, oil, cotton-seed and cake, planing mill products, including sash, doors, and blinds; flour and grist-mill products; printing and publishing; brick and tile; furniture; and foundry and machine-shop products. The total annual value of manufacturing products in the State is upwards of $60,000,000.

Mining.—The bituminous coal output is valued at about $3,000,000. In close proximity to the coal-beds

are almost inexhaustible deposits of hematite and other iron ores, with lime-stone, and hard-wood for charcoal close at hand. There are also large, convenient, and unfailing water-powers. Zinc, lead, and silver mines have been opened in the northern part of the State, while in Garland county are to be found lead, copper, and the celebrated novaculite hone-stone, as well as tripili. Polk county contains manganese of fine quality; Saline county, containing iron, copper, lead, argentiferous galena, nickel, steatite, and serpentine, being among the richest in mineral wealth; while Logan county produces a splendid quality of micaceous fire-clay, and Carroll county has a beautiful quality of pink marble. The oldest mine in the State is in Pulaski county.

Railroads.—Owing to the fact that the supreme court had called $5,350,000 railroad aid bonds illegal, the railroad development prior to 1880 was not rapid, but since that date it has extended rapidly until there are about 5,000 miles of track in the State at present. There are also about 10 street railway lines.

Commerce.—Commerce is chiefly domestic, being largely by means of the Mississippi, the Arkansas, and other navigable waters. The export trade covers cotton, corn, oats, wool, lumber, and hides.

Education.—Consolidation of school districts has recently done much toward building up the previously unsatisfactory public school system. There are now 366,054 pupils in the public schools of the State, and 8,297 teachers. Four agricultural schools have latterly been established, besides which there are a few normal schools and about 10 colleges and universities.

History.—Originally a portion of the territory of Louisiana, purchased from Napoleon I., 1803, for $15,000,000, the present state of Arkansas seems to have derived its designation from the name applied by the Algonquins to a specific tribe of Indians which had their habitat within its borders. In the early French documents the word is written *Alkansas.* In 1812, the present state of Louisiana was set apart from the rest of the purchase and admitted into the Union, and the remainder was organized as Missouri territory, and continued as such until 1819, March 2, when Missouri in turn became a state, and the present state of A. a separate territory under that name. From this time until 1836, June 15, the government was territorial. At that time a convention at Little Rock framed a constitution, and A. was admitted as a state. Its progress was generally slow, although it nearly doubled in population every ten years to 1860. In 1861, Jan., a popular vote was held on the question of appointing a convention to decide with regard to secession, and it was decided in favor of the convention by 27,412 to 15,826. The convention met in March and again in May, when a secession ordinance was passed by a practically unanimous vote. In the meantime the various arsenals had been

seized by the state authorities, and a year later, March 6 and 7, 1862, was fought the decisive battle of Pea Ridge between the Confederates, led by Gen. Van Dorn, and the Union forces, by Curtis, in which the latter was the victor, and at once seized and occupied Helena. Another serious defeat of the Confederates was that of 1863, Dec. 7, when Gen. Hindman was worsted at a point near Fayetteville by Gen. Blunt, losing about 1,200 men. On Jan. 11, following, Gen. McClernand and Admiral Porter captured Arkansas Post on the A. river; and 1863, July 4, Gen. Prentiss defeated the Confederates under Gen. Holmes, in their attempt to recapture Helena The disasters of the Confederates culminated in the capture of Little Rock, 1863, Sept. 10, by an expedition commanded by Gen. Steele, and on Oct. 30 the first step was taken looking towards the re-establishment of a state govt. in a public meeting at Fort Smith. In 1864, Jan. 8, a convention at Little Rock continued this movement by framing a loyal constitution, and on this being put to vote at a general election in March, it was carried, and entire state, county, and congressional tickets elected, and by April the new state organization was in full force. Congress, however, refused to accept it or admit the state. Under the Reconstruction Act of 1867, A. and Mississippi became the fourth military district. In 1868, Jan. 7, a convention met at Little Rock for the purpose of framing a constitution which would be acceptable to all concerned and allow of its readmission to the Union. On March 13 this constitution was adopted by a small majority and the state readmitted to the Union on June 22 of that year. Several counties were again put under military rule in 1868 and it was not until 1869, March 22, that martial law ceased throughout the state. Unrest, however, prevailed for several years afterward and under the régime of the carpet-bag government a condition of affairs bordering on anarchy continued until it finally culminated in April, 1874, in the armed collision between the political adherents of the Republican and Democratic candidates for the governorship. The aid of the Federal government was invoked and Baxter, the Republican, was seated by Pres. Grant. Since then, however, the Democrats have been successful in both state and national elections. Again in 1874 a new constitution was framed and adopted and under this the state now works.

Finances.—About 1880 there arose a serious dispute between the state and national governments, because the former asserted the right to offset certain state coupon bonds which the latter held, by an unliquidated claim which had arisen through failure of the United States to patent 273,000 acres of swamp land to it. After 20 years' discussion the matter was adjusted in 1900; the state relinquishing claim to the land, guaranteeing the titles to the settlers and paying $160,000 to the United States government. Assessed valuations were: (1880)

$86,409,364; (1890) $174,737,755; (1900) $189,999,045. The total recognized bonded debt 1901, Sept. 15, was $1,271,000, all in 3 per cent. refunding bonds; unrecognized debt, $8,706,773; tax rate 1.19 mills. In 1910 the bonded debt amounted to $1,250,500, while the tax rate of the State was $6.75 per 1,000. The total assessed valuation was $327,023,552.

Government.—The executive authority is vested by the constitution (1874) in a gov., elected for 2 years, salary $3,500 per annum; the legislative in a general assembly, comprises a senate of not less than 30 nor more than 35 members elected for 4 years, and a house of representatives of not less than 73 nor more than 100 members elected for 2 years, salary of each $6 per day; and the judicial in a supreme court of 5 judges, circuit courts for which one judge is elected in each judicial district, co. courts of one judge each, who is also judge of probate, courts of common pleas held by the co. judges at the direction of the general assembly, chancery court in Pulaski co., prosecuting atty. in each circuit, and justices of the peace. The gov. must be a citizen of the United States, at least 30 years of age, and must have resided in the state 7 years. In case of a tie vote for gov., choice is made by a joint vote of the general assembly. The constitution gives him power to veto any single item in an appropriation bill. In the death, absence, or disability, the pres. of the senate acts in his stead. All other members of the executive dept. are elected at the same time and in the same manner as the governor. The general assembly holds biennial sessions in odd numbered years, meeting on the second Monday in Jan., and limited to 60 days. In case of disagreement between the two houses with respect to the time of adjournment, the gov. may adjourn them to such time as he may think proper, not beyond the day of the next meeting of the gen. assembly. Senators must be 25 years of age and have a state residence of 2 years, and representative must be 21 years of age and have similar residence. Impeachments are to be preferred by the house and tried by the senate, the chief-justice presiding. All state officers are liable to impeachment, or may be removed by the gov. for cause upon the joint address of two-thirds of each house. Judges of the supreme court are elected for terms of 8 years; they must be 30 years of age and in practice 8 years prior to election. Judges of the circuit courts must be 25 years of age, and residents in the circuits. Where a circuit judge is absent or disqualified, the members of the bar may elect a temporary special judge, and when any supreme judge is disqualified to sit in any case, the gov. appoints a special judge to take his place. State elections are held biennially in even-numbered years, on the first Monday in Sep.; congressional and presidential elections Tuesday after first Monday in Nov. Indians,

idiots, and persons convicted of crime are excluded from voting.

No co. or municipal corporation can become a stockholder in any company, or lend its credit to any such company; nor can it levy a tax exceeding one-half of 1 per cent. for all general purposes.

The successive govs., with their terms of service, are as follows: *Terr.:* James Miller 1819–25; George Izard 1825–29; John Pope 1829–35; William S. Fulton 1836–36; *State:* James S. Conway 1836–40; Archibald Yell 1840–44; Samuel Adams (acting) 1844; Thomas S. Drew 1844–48; John S. Roane 1848–52; Elias N. Conway 1852–60; Henry M. Rector 1860–64; Isaac Murphy 1864–68; Powell Clayton 1868–71; Ozro A. Hadley (acting) 1871–72; Elias Baxter 1872–75; Augustus H. Garland 1875–77; William R. Miller 1877–81; Thomas J. Churchill 1881–83; James H. Berry 1883–85; Simon P. Hughes 1885–89; James P. Eagle 1889–93; W. M. Fishback 1893–95; James P. Clark 1895–97; Daniel W. Jones 1897-1901; Jefferson Davis 1901-6; 1907 (acting) X. O. Pindall; 1908 George W. Donaghey; re-elected 1910.

Politics.—A.'s electoral votes for pres. and vice-pres. have been as follows: 1836, Martin Van Buren and Richard M. Johnson; 1844, James K. Polk and George M. Dallas; 1848, Lewis Cass and William O. Butler; 1852, Franklin Pierce and William R. King, 4; 1856, James Buchanan and John C. Breckinridge; 1860, John C. Breckinridge and Joseph Lane; 1864, no vote; 1868, Ulysses S. Grant and Schuyler Colfax, 5; 1872, 6 votes not counted; 1876, Samuel J. Tilden and Thomas A. Hendricks; 1880, Winfield S. Hancock and William H. English; 1884, Grover Cleveland and Thomas A. Hendricks, 7; 1888, Grover Cleveland and Allen G. Thurman; 1892, Grover Cleveland and Adlai E. Stevenson, 8; 1896, William J. Bryan and Arthur Sewall, 8; 1900, William J. Bryan and Adlai E. Stevenson, 8; 1904, Alton B. Parker and Henry G. Davis, 9.

Counties, Cities, and Towns.—A. is divided into 75 counties. The most populous *counties* are: Pulaski, 86,751; Jefferson, 52,734; Sebastian, 52,278; Washington, 33,889; Benton, 33,389; Phillips, 33,535. The most populous cities and towns are Little Rock, 45,941; Pine Bluff, 15,102; Fort Smith, 23,975; Hot Springs, 14,434.

Population.—(1820) white 12,579, free colored 77, slave 1,617, total 14,273; (1830) white 25,671, free colored 141, slave 4,576, total 30,388; (1840) white 77,174, free colored 465, slave 19,935, total 97,574; (1850) white 162,189, free colored 608, slave 47,100, total 209,897; (1860) white 324,191, free colored 144, slave 111,115, total 435,450; (1870) white 362,115, colored 122,169, total 484,471; (1880) white 591,531, colored 210,666, total 802,525; (1890) white 818,752, colored 309,427, total 1,128,179; (1900) 1,311,564; (1910) 1,574,449.

ARKANSAS CITY: city in Cowley co. Kan., at the confluence of Walnut Creek with the Arkansas river; on the Atchison Topeka and Santa Fé, the St. Louis and San Francisco, and the Missouri Pacific railroads; 14 m. s. of Winfield, 250 m. s.w. of Kansas City. It has a city hall, national and state banks, loan and investment cos., daily and weekly newspapers. There are manufactures of lumber, flour, chairs, mattresses, wind-mills, etc. It is in a stock-raising and grain-growing country, possesses water-power, and has an extensive trade with Indian Territory. Pop. (1890) 8,347; (1900) 6,140; (1910) 7,508.

ARKANSAS RIVER: next to the Missouri the largest affluent of the Mississippi. It is 2,000 m. long, rising in the Rocky Mountains on the borders of Utah, and joining the 'Father of Waters' lat. 33° 54′ n., long. 91° 10′ w. Flowing generally through a level country, it presents few obstacles to navigation. The principal difficulty is connected with its periodical rise and fall—the difference between season and season being not less than 25 ft. Notwithstanding this, the A. is navigable for steamboats, during nine months of the year, 650 m. from its mouth. It divides the state which takes its name into nearly equal parts.

ARKANSITE, n. *ârk'ăn-zīt* [from *Arkansas,* where it is found]: a mineral, a variety of Brookite. It occurs in thick black crystals.

ARK OF THE COVENANT, Ark of the Testimony, or Ark of Jehovah: one of the most important parts of the furniture of the Tabernacle which, by Divine direction, the Israelites constructed in the wilderness; and afterwards of the temple built by Solomon at Jerusalem. From Ex. xxv., xxxvii., it appears that it was a chest of shittim-wood (doubtless the wood of a species of acacia), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height—that is, according to the common estimate of the length of the cubit, 3 ft. 9 in. in length, and 2 ft. 3 in. in breadth and height—the lid being formed entirely of pure gold, with a crown or raised border of gold round about. Within the ark was deposited the 'testimony,' consisting of 'the two tables of the law,' i.e., the stone tablets upon which the ten commandments were inscribed. The golden lid of the ark was called the *mercy-seat* or *propitiatory,* and above it were the *cherubim* (q.v.), made of the same piece of gold with it, and between them was the place of the *Shechinah* or manifestation of the Divine presence. The ark had also golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (see Numbers, iv.). While carried it was covered first with a 'covering of badgers' skins,' and above this with 'a cloth wholly of blue;' and in the tabernacle and temple it was put into the 'most holy place,' into which the high-priest

alone was to enter upon the 'day of atonement.' The ark was called the A. of the C., because it was the appointed symbol of the presence of God as the God of Israel, and of his covenant with his people. The things of the Jewish dispensation being regarded as typical, and the Jewish religion as essentially one with the Christian, the ark is commonly regarded as a type of Christ; the excellency and unchangeableness of the moral law, as indicated by the place assigned to it within the ark, which, however, sprinkled with the blood of typical sacrifice, was interposed between it and men, who, having transgressed it, were exposed to its curse; and the mercy-seat, in like manner sprinkled with the blood of sacrifice, was interposed, as it were, between the law and God, who is represented in the Old Testament as 'dwelling between the cherubim,' and thence shining forth as the God of mercy, favorable to those that sought Him. A complete harmony is thus made out between these Old Testament types and the Christian facts.—It is worthy of notice, that sacred arks or chests have been connected with the worship of various heathen nations, and have been placed as the most sacred things in the innermost parts of the temple, which only the priests were permitted to enter. The relation of these to the ark of the Jews has been the subject of much learned inquiry, but has not yet received thorough elucidation.—The ark appears not to have been brought back from Babylon, and so never to have been in the second temple. No figure of it appears among the sacred vessels of the temple represented on the Arch of Titus.

ARKONA, *âr-kō'nâ:* n.e. promontory of the island of Rügen, in the Baltic, almost the most n. extremity of Germany. Its steep cliffs mainly consist of mixed chalk and loam, with horizontal veins of flint; there is a small deposit of pure chalk towards the east. Myriads of sand-martins build in the clefts of these cliffs. The view from their summit extends to the coast of Jasmund on the right, on the left to the islands of Hiddensöe and Möen. The name A. is very ancient. In the chronicles of Saxo Grammaticus we find it written Archona, but its derivation is quite uncertain. On the w. side is the famous wall or fortified inclosure in which stood the temple of the Wend deity Swantewit. King Waldemar I. of Denmark after a bloody conflict, took possession of the fortress in 1168, burnt the idol and its temple, and carried away its treasures to Denmark. On its site, a lighthouse, 75 ft. high, was built in 1827.

ARKOSE, n. *âr'kōs* [Eng. *ark*]: a mineral compound formed of the same materials as granite, from the disintegration of which it has evidently been derived.

ARKSUTITE, n. *ârk'sô-tīt*, or ARK'SUDITE, *-dīt* [from *Arksut Fiord*, in s. Greenland]: mineral classed by Dana in his Cryolite group of fluorine compounds. It is a white, translucent, and brittle species, with vitreous lustre, except on cleavage faces, where it is pearly. Its composition is fluorine, 51·03; alumina, 17·87; lime, 7·01; soda, 23·00; water 0·57. It has been proved to be Chiolite.

ARKWRIGHT, *ârk'rīt*, Sir Richard: 1732, Dec. 23—1792; b. Preston, Lancashire: celebrated for inventions in cotton-spinning. Of humble origin, the youngest of thirteen children, and bred to the trade of a barber, his early opportunities were exceedingly limited. In 1760, he gave up his business as a barber in Bolton, and became a dealer in hair. A secret process for dyeing hair, said to have been discovered by himself, increased considerably the profits of his trade. Very little is known regarding the first movements of his mind in the direction of mechanical invention. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture. That the development of his mechanical ingenuity was not, however, due to circumstances, is proved by the fact that his first effort was an attempt to discover the perpetual motion. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767, he seems to have given his whole attention to inventions in cotton-spinning. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair moving slowly in contact, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Mr. Charles Wyatt, of Birmingham, which was patented in 1738, but never succeeded, deprives A. of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time A. was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. He soon removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Mr. Jedidiah Strutt, of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner, Mr. Need. In 1769, A. set up his first mill, driven by horses, and took out a patent for his invention. In 1771, he set up a larger factory, with water-power, at Cromford, in Derbyshire. The remarkable capabilities of his mind were strikingly evinced in the management of the great business which now demanded his undivided attention. Without personal experience, and with no model to guide him, he introduced a system of management so admirable that it was afterwards universally adopted, and has never been materially improved. In 1775, he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade

ARKWRIGHT.

his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action against Colonel Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that his description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and, in the following year, A. published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the Court of King's Bench, a few months later, when A.'s claim to the inventions patented was for the first time called into dispute. On the doubtful evidence of a person named Highs, or Hayes, combined with that of A.'s old assistant, Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out A. as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who abridged labor, but in reality increased its sphere; and on one occasion, a large factory belonging to A. was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of A., however, triumphed over all opposition; and at the time of his death, in 1792, the value of his property amounted to about half a million sterling. In 1786, he was appointed high-sheriff of Derbyshire; and on the occasion of presenting an address to the king, congratulating him on his escape from the knife of the maniac Margaret Nicholson, he received the well-merited honor of knighthood. A severe asthma had pressed upon him from his youth; and a complication of disorders, the result of his busy sedentary life, terminated his honorable career at the comparatively early age of sixty.—See SPINNING.

ARKYS, n. *ârk'ĭs* [Gr. *arkus*, a net]: genus of spiders. The *A. lancier*, a native of S. Amer., is yellow with red at the sides.

ARLES, n. plu. *ârlz* or *ārlz* [Scotch: L. *arrha:* F. *arrhes:* It. *arra*, earnest money, a deposit: Gael. *earl*, provision, caution]: in *Scot.*, a piece of money given for confirming a bargain, as in hiring a servant; earnest-money. ARLE, v. *ârl*, to give a piece of money to a person to confirm a bargain. ARLING, imp. *âr'lĭng*. ARLED, pp. *ârld*, hired by receiving arles.

ARLES, *ârlz* (anciently, *Arelate*): one of the oldest towns in France, on the left bank of the principal branch of the Rhone, after it has divided into a delta, in the dept. of Bouches du Rhone. A. has considerable trade. It manufactures silk, hats, tobacco, brandy, etc., and is a

market for the productions of the surrounding country. It also possesses a college, a naval school, a public library, and a superb museum of antiquities in natural history. The marshes which long rendered the district unhealthy have been largely drained, and a canal has been formed which connects it with the s. coast. Railways also bring it into easy communication with Marseilles, Avignon, Nimes, Montpellier, etc. Under the Romans, it was the seat of a prefect; afterwards the residence of the Gothic king, Eurich; and, 879, was the metropolis of the kingdom of Arelate. See BURGUNDY. In the early Christian times, important synods were convened here (314, 354, 452, and 475). Among the antiquities are a magnificent amphitheatre, which could contain between 20,000 and 30,000 spectators; the ruins of a palace of Constantine the Great; and a mediæval cathedral with a splendid portal arch. Pop. (1893) 14,431; (1901) 15,506.

ARLINCOURT, *âr'lăn-koor'*, CHARLES VICTOR PREVÔT, VICOMTE D', a French poet and novelist: b. in 1789; d. in 1856. His chief poetical work is *Charlemagne, or the Caroleid* (1818), an epic; and of his novels the most successful was *Le Solitaire* (1821), which was translated into all European languages. Among several pamphlets, written in support of the Legitimist cause in 1848, one entitled *God Wills It* went through 64 editions.

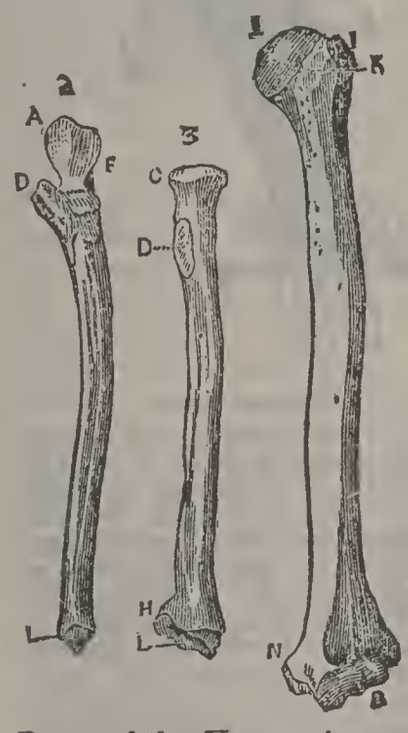
ARLINGTON, *âr'lĭng-ton:* town in Middlesex co., Mass.; on the Boston and Maine railroad; 6 m. n.w. of Boston, with which it is connected also by horse-railroad. This pleasant and prosperous town has market-gardening and ice-cutting industries, national and savings banks, a weekly newspaper, several churches, a public library, and a number of manufacturing establishments. Pop. (1880) 3,906; (1890) 5,629; (1900) 8,603; (1910) 11,187.

ARM, v. *ârm* [F. *armer;* Sp. *armar,* to arm; F. *arme,* a weapon—from L. *armārĕ,* to arm—from *arma,* weapons of war]: to furnish with arms; to take up arms. ARM'ING, imp. ARMED, pp. *ârmd:* ADJ. *ârm'ĕd,* furnished with weapons; morally fortified; in *her.,* colored. ARM'LESS, a. without weapons. ARMS, n. plu. *ârmz,* weapons of war; state of hostility; war in general; signs armorial. ARMY, n. *âr'mĭ;* ARMIES, plu. *âr'mĭz* [F. *armée*]: a body of men armed for war; a host; a large number. FIREARMS, warlike weapons only effective with p wder and shot, as distinguished from swords and lances. PASS or PASSAGE OF ARMS, a kind of combat with swords. STAND OF ARMS, a complete set of arms for one soldier. UNDER ARMS, in a state of immediate readiness for fighting. TO ARMS, a call or summons to engage in actual hostilities. SMALL-ARMS, those which can conveniently be carried by a soldier. TO THROW or LAY DOWN ARMS, to surrender to an enemy by giving up arms. SIDE-ARMS, such arms as may be worn attached to the person, as sword, bayonet, etc. COATS OF ARMS, in *her.,* any signs or devices of heraldry painted or engraved, used as symbols of quality or distinction. ARMA, n. plu. *âr'mă,* in *bot.,* such appendages of plants as prickles

and thorns. Ar'my-list, n. a published printed list of officers of the army. Arming-Buckle, n. in *heraldry,* a lozenge-shaped buckle. Arming-Doublet, n. a surcoat. Arming-Points, n. pl. the fastenings keeping the several pieces of armor from separating. Arming-Press, n. a press used in book-binding.

ARM, n. *ârm* [AS. *earm;* L. *armus,* the shoulder-joint, the arm. Icel. *armr*]: a limb of a body; a branch of a tree; inlet of the sea. Armful, n. *ârm'fûl,* as much as an arm can embrace when bent in towards the breast. Armhole, n. *ârm'hōl,* Prov. and OE., the arm pit; the hole in a garment for the arm. Arm'-like, a. *-līk,* of the form or appearance of an arm. Arm'less, a. without arms. Arm'let, n. a little arm; a bracelet. Arm-chair, n. a chair with arms to support the elbows. Arm'-pit, n. the cavity under the shoulder. Fore-arm, n. the part of the arm lying between the elbow and the wrist. Arm of the sea, a part which runs far into the land. Arm's-length, n. the length of the arm: Adj. at a distance. Arm's-End, n. the end of the arms; a good distance off. Arm-Shaped, a. shaped like the arm. Arm's-Reach, n. the distance to which the arm can reach. Arm-in-Arm, or Arm-and-Arm, ad. or a. with one's arm interlocked in that of another.

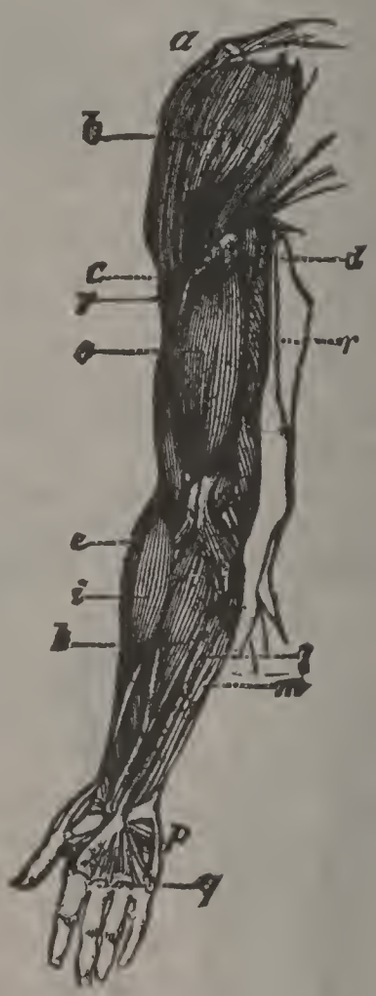
ARM: the upper extremity of the human body; consisting of two portions—the A., strictly so called, and the forearm; the former having one bone, the humerus (1), which moves freely by a globular head upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius (3) and ulna (2), which move on the lower end of the humerus, forming the elbow-joint, and below with the carpus forming the wrist.



Bones of the Human Arm.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion; and were it not for the muscles attached at I and K, would be frequently dislocated, but it is supported by these muscles on all sides except underneath or opposite the armpit, into which the head of the bone is sometimes driven. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder is a large triangular muscle, the deltoid, which lifts the A. from the side. At the back is the triceps, which extends the forearm; in front are two

muscles which flex or bend it—the biceps, and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while on each side above, the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.). The motions of the ulna are flexion or bending effected by the biceps, and extension or straightening by the great extensor muscle, the triceps, its projections, D and A, being received in these movements into corresponding depressions on the humerus. The movements of the hand are principally due to the radius, the head of which rolls at C and H upon the ulna at F and L, thereby turning the palm downwards (pronation), or restoring the palm upwards (supination), these movements being effected by muscles, two for each movement, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow-joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is extremely liable to dislocations, often accompanied by fracture, especially in the young.



Human Arm:
abc, deltoid muscle; *d*, coraco brachialis muscle; *r*, *r*, triceps; *e*, *i*, extensors of wrist and long supinator of the hand; *km*, flexor of fingers and radial and ulnar sides of the wrist, and *l*, palm of the hand, or palmaris longus; *p*, palmaris brevis; *q*, palmar fascia; *o*. biceps.

The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow (at which situation one was frequently selected for venesection when this operation was in fashion) and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculospiral soon passing round at the back to appear on the outside, and become the radial and posterior interosseous nerves; the ulna running behind the internal condyle, N.; it has obtained the term 'funny bone,' from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The

median, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, the bleeding is often excessive but may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcra or centres of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put, agility is of far greater moment than dead strength.

ARM: in maritime language (besides the obvious application to weapons of warfare), a term applied to each extremity of a bibb, or bracket, attached to the mast of a ship for supporting the trestle-trees. The same name is also given to a part of the anchor. See ANCHOR.—In military language, the infantry, the cavalry, the artillery, and the engineers are each called 'an A.' of the service—equivalent to branch or department.

ARMADA, n. *ar-mā'dă* [Sp. *armada*, the fleet, the navy —from *armar*, to arm—from L. *armārĕ*, to equip with arms; *armātă*, armed]: a fleet of war-ships; especially the great Spanish fleet of war-ships which attempted the invasion of England in the reign of Elizabeth, 1588. The king of Spain, Philip II., had resolved to strike a decisive blow at the Protestant interest, by conquering England, which Pope Sixtus V. had made over to him. The ports of Spain, Portugal, and other maritime dominions belonging to him had long resounded with the noise of his preparations, and the most eminent Rom. Cath. soldiers from all parts of Europe flocked to take a share in the expedition. The Marquis of Santa-Croce, a sea-officer of great reputation and experience, was selected to command the fleet, which consisted of 130 vessels, of greater size than any hitherto seen in Europe. The Duke of Parma was to conduct the land-forces, 20,000 of whom were on board the ships of war, and 34,000 more were assembled in the Netherlands, ready to be transported into England; so that, as no doubt was entertained of success, the fleet was ostentatiously styled the Invincible A. Nothing could exceed the terror and consternation which seized all ranks of people in England upon the news of this terrible A. being under sail to invade them. A squadron of not more than thirty ships of the line, and those very small in comparison, was all that Elizabeth had to oppose it by sea; and it was considered impossible to make any effectual resistance by land, as the Spanish army was composed of men well disciplined and long inured to danger. But although the English fleet was much inferior in number and size of shipping to that of the enemy, it was much more manageable, while the dexterity and courage of the mariners were greatly superior. Lord Howard of Effingham, a man of

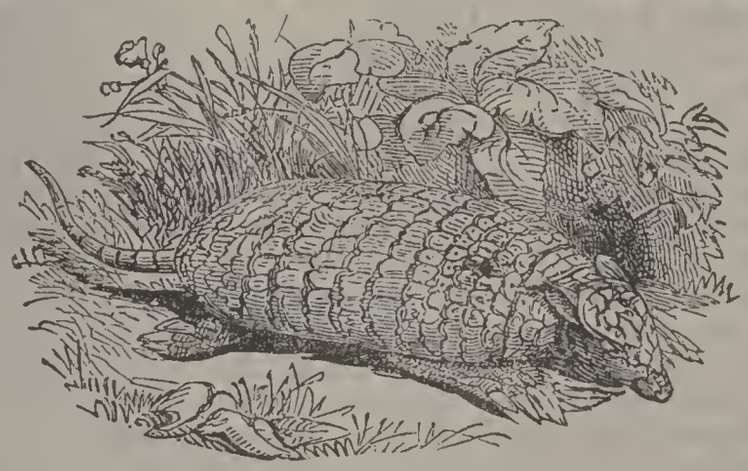
great valor and capacity, took upon him, as lord high admiral, the command of the navy; Drake, Hawkins, and Frobisher, the most renowned seamen in Europe, served under him; while another squadron, consisting of forty vessels, English and Flemish, commanded by Lord Seymour, lay off Dunkirk, in order to intercept the Duke of Parma. Such was the preparation made by the English; while all the Protestant powers of Europe regarded this enterprise as the critical event which was to decide forever the fate of their religion. Meantime, while the Spanish A. was preparing to sail, the admiral, Santa-Croce, died, as likewise the vice-admiral, Paliano; and the command of the expedition was given to the Duke of Medina Sidonia, a person utterly inexperienced in sea affairs: these unexpected circumstances served, in some measure, to frustrate the design. Some other accidents also contributed to its failure. Upon leaving the port of Lisbon, the A. next day met a violent tempest, which sank some of the smallest of the ships, and obliged the rest to put back into the harbor. After some time spent in refitting, the Spaniards again put to sea, where they took a fisherman, who gave them intelligence that the English fleet, hearing of the dispersion of the A. in a storm, had returned to Plymouth, and that most of the mariners were discharged. From this false intelligence, the Spanish admiral, instead of going to the coast of Flanders, to take in the troops stationed there, resolved to sail directly to Plymouth, and destroy the shipping laid up in the harbor. But Effingham was very well prepared to receive him, and had just left port, when he saw the Spanish A. coming full sail towards him, disposed in the form of a half-moon, and stretching seven miles from one extremity to the other. The English admiral, seconded by Drake, Hawkins, and Frobisher, attacked the Spaniards at a distance, pouring in their broadsides with admirable dexterity. They did not choose to engage the enemy more closely, because they were greatly inferior in number of ships and guns, as well as in weight of metal; nor could they attempt to board such lofty vessels without manifest disadvantage. In this action, however, two Spanish galleons were disabled and taken. As the A. advanced up the Channel, the English still followed and infested its rear; and as their ships continually increased from different ports, they soon found themselves in a capacity to attack the Spanish fleet more nearly, and accordingly fell upon them while they were taking shelter in the port of Calais. To increase their confusion, Howard selected eight of his smaller vessels, which, after filling them with combustible materials, he sent one after another, as if they had been fire-ships, into the midst of the enemy. The Spaniards, taking them for what they seemed to be, immediately bore off in great disorder; while the English, profiting by their panic, captured or destroyed about twelve ships. The Duke of Medina Sidonia being thus driven to the coast of Zealand, held a council of war, in which it was resolved that, as their ammunition began to fail, as their fleet had

ARMADILLOS AND ANT-EATERS.

1. Pangolin (*Manis pentadactyla*).
2. Three-banded Armadillo (*Tolypentes tricinctus*).
3. *Pichiciago* (*Chlamydophorus truncatus*).
4. Aard-Vark (*Orycteropus Afra*).
5. Tamandua (*Tamandua tetradactyla*).
6. Great Ant-Eater (*Myrmecophaga jubata*).

received great damage, and as the Duke of Parma had refused to venture his army under their protection, they should return to Spain, by sailing round the Orkneys, as the winds were contrary to their passage directly back. Accordingly, they proceeded northward, and were followed by the English fleet as far as Flamborough Head, where they were terribly shattered by a storm. Seventeen of the ships, having 5,000 men on board, were afterwards cast away on the Western Isles and the coast of Ireland. Of the whole A., fifty-three ships only returned to Spain, and these in a wretched condition. The seamen, as well as the soldiers who remained, were so overcome with hardships and fatigue, and so dispirited by their discomfiture, that they filled all Spain with accounts of the desperate valor of the English, and of the tempestuous violence of that ocean by which they were surrounded.

ARMADILLO, n. *âr'mă-dĭl'lō* [Sp. dim. of *armádo*, a man in armor—from L. *arma*, arms, from its scaly covering] (*Dasypus*): genus of *Mammalia* of the order *Edentata* (i e., toothless)—not, however, truly toothless, but having feeble teeth destitute of true roots, and set apart from each other, and so that those of the one jaw fit into the interstices of those of the other. The number of the teeth is different in different species. The muzzle is elongated, and the tongue smooth and slender, with a glutinous saliva, adapted to the capture of ants and other



Armadillo.

insects, after the manner of the ant-eaters, but not long and extensile, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted. But that which peculiarly distinguishes the A., and in which this genus differs from all the other mammalia, except the *Chlamyphorus* (q.v.), is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form

solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands, in most species, protecting also the tail. Within these plates the animal is able to roll itself up like a hedgehog. Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they are found in immense numbers. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feed chiefly on vegetable food. The largest species is fully three ft. long, exclusive of the tail; the smallest, not above ten inches. The species are numerous, and the genus has been divided into a number of sub-genera, which some naturalists elevate into genera, naming the family *Loricata* (i. e., mailed). To this family belongs also the genus *Chlamyphorus*, also South American. Fossil remains of gigantic extinct armadillos have been found in the pleistocene strata of South America, forming the genus *Glyp'todon* of Owen, so named from the fluted teeth.

ARMADIL'LO: scientific name of a genus of *Crustacea* of the order *Isopoda* of Cuvier. This is one of the genera usually included under the popular name of Woodlouse, and one of which (*Porcellio*) is very generally known by that of Slater. The armadillos derive their name from the scaly armor of their body, in which an analogy is found to the mailed quadrupeds of South America. These little creatures have, in a remarkable degree, the power of rolling themselves into a ball, when alarmed, so as to expose nothing but the plates of the back, and have thence received the name of Pill Beetles. Like some of the other closely allied *Isopoda*, they were at one time reputed to possess medicinal virtues, now accounted merely imaginary. They are not only used in a dried and pulverized state, but they are said to have been actually swallowed entire as pills. The *Isopoda* are now made a sub-order of *Tetradecapoda* (fourteen-footed).

ARMAGH, *âr-mâ':* a small inland county in Ulster, Ireland, bounded n. by Lough Neagh, e. by Down, s. by Louth, w. by Monaghan and Tyrone: greatest length 32 m., and breadth 20; 512 sq. m., about four-fifths being arable, and a 36th part in woods. The surface is hilly in the s., and undulating in the centre, attaining in Slieve Gullion, in the s.w., the height of 1,893 ft. The country bordering upon Lough Neagh is low and boggy, and the Louth plain extends into the s. end of A. The principal rivers, navigable in their lower parts, are the Upper Bann, flowing out of Down n.w. 11 m. before it

enters Lough Neagh; and the Blackwater, which, in its lower part, separates A. from Monaghan. The rocks of A. are—Lower Silurian in the s. and middle of the county; the trap of Antrim, with the underlying greensand, around Portadown; carboniferous limestone in the basins of the Blackwater, and its tributary the Callan; granite in the mountains of the s.e.; and tertiary strata bordering Lough Neagh. The soil is fertile except in the southern extremities. The chief article of manufacture is linen; the principal crops are oats, wheat, potatoes, turnips and flax. Horses, cattle, hogs, and sheep are raised. The n. and central parts of A. have a dense population, and contain low hills cultivated to the tops, hedgerows, orchards, and thickly-scattered farm-steadings. The county is mostly in the diocese of Armagh. It returns three members of parliament. The chief towns are A., Lurgan, Portadown, and Newry (which, however, is mostly in Down). Pop. (1871) 179,260; (1881) 163,177; (1891) 143,289; (1901) 125,392.

ARMAGH: capital of the county of A., in a carboniferous limestone district, in the n.w. of the county. It is situated around and on a gentle eminence, hence its original name, Ard-Magha, 'the high field.' It is built of limestone. The cathedral, or red sandstone, is cruciform—184 by 119 ft.—and is supposed to occupy the site of that erected by St. Patrick in the 5th c. It has had extensive repairs, chiefly at the cost (£10,000) of the late lord primate, John George Beresford. A Gothic Rom. Cath. cathedral occupies the principal height to the n., and the primatial palace that to the s. There is a fever hospital for forty patients, maintained by the late primate, and a lunatic asylum for four counties. A. is the seat of the archiepiscopal see of the primate and metropolitan of all Ireland, who, before the disestablishment of the Irish Church, had an income of £12,087 a year. The chief manufacture is linen-weaving. A., from the year 495 to the 9th c., was the metropolis of Ireland, the native kings living at Eamania, 2 m. to the w. of the city. It was then renowned as a school of theology and literature—its college being the first in Europe. After the Reformation, it suffered severely in the conflicts between the English and Irish; and it contained only three slated houses in 1765. Pop. (1901) about 10,500.

ARMAGNAC, *âr-mân-yâk* (*Ager Aremonicus*): old name of a district in the s. of France, which at one time seems to have extended from the valleys of the Pyrenees to the Garonne. It is now included in the departments of Hautes Pyrénées and Gers. The remarkably fertile land, producing grain and the best descriptions of wine, and also favorable for pasturage, is cut up into an extraordinary number of small estates, and divided among numerous petty proprietors. The principal branch of trade is the

distillation of the brandy known in commerce as *Eau d'Armagnac,* which rivals those of Cognac and Saintonge. The ancient capital is Lectoure, on the river Gers, with about 3,000 inhabitants. To the s. of it lies Auch, the chief town of the department of Gers. Pop. about 12,000. The people are noted for their simplicity, strength, and bravery; but are extremely credulous and ignorant. Formerly, their services were highly valued in times of war. The A. family, descended from the old Merovingian king, Clovis, was important in French history.

ARMAGNAC, Bernard VII., Count d': leader of the 'Armagnacs' in their civil war with the Burgundians, and afterwards chief minister and constable of France under Queen Isabeau. His unscrupulous and tyrannical measures made him odious to the people, and in 1418, when Paris was taken by the Burgundians, he and a large number of his followers were massacred.

ARMAGNAC, Jean V., Count d': b. abt. 1420: grandson of Bernard. He was excommunicated by the pope for marrying his own sister, who had been engaged to Henry VI. of England. He joined the League of the Public Good against Louis XI. of France, through which he lost his estates, but they were restored to him. He was put to death by the king's troops in 1473.

ARMAMENT, n. *âr'mă-mĕnt* [L. *armamen'ta,* implements, utensils—from *arma,* weapons of war]: a land or naval force fitted out for war. Also, all the weapons collectively employed in sea and land battles, are called the A. of a ship or of an army.

ARMAN, n. *âr'măn:* a confection for restoring appetite in horses.

ARMAND, *âr-mŏn',* Charles, Marquis de la Rouarie, *dĕh lâ rô-â-re':* 1756–93: French soldier who volunteered in the American army during the Revolutionary war, and rose to the rank of brig.gen. He afterwards took part in the French Revolution, on the royalist side, serving in Brittany and Anjou.

ARMANSPERG, *âr'mân-spĕrg',* Joseph Ludwig, Count of: 1787–1853; b. in Lower Bavaria: formerly president of the government in Greece. He early began an administrative and diplomatic career. On the accession of King Louis to the throne, A., who had already occupied several important posts, was summoned to Munich, where, rapidly rising from one dignity to another, he at length became minister of finance and of foreign affairs. In both capacities he proved active and successful; but he drew upon himself the hatred of the Camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the decidedly liberal party. The consequence was that, in 1831, he lost his post, and in the same year was appointed ambassador to London, but preferred retiring to his family estate. However, he could not resist the king's repeated request that he would undertake the formation of his son's government in Greece; and

accordingly, accompanying young King Otho, A. landed at Nauplia, 1833, Jan. For four years he was at the head of public affairs, and Greece derived many benefits from his administration; but the heat of party strife and court intrigues led to his dismissal, and he left Greece, 1837, March, retiring to his estate near Deggendorf.

ARMATO'LES: a body of Greek militia, first formed under the reign of Sultan Selim I. about the beginning of the 16th c. They were intended to preserve the fertile plains from the ravages of the *Klephts* (mountain robbers of Thessaly) who had never been entirely conquered by the Turks. The A. themselves were originally Klephts, but received their more honorable designation when the Porte had metamorphosed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of Northern Greece was divided into sixteen districts (*capitaineries*), each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the A. frequently suppressed the brigandage of the Klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country; and the sentiment of patriotism overruled every other consideration. This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the A. the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the Porte ever dreaded. The moment it broke out, the A. pronounced themselves in favor of the national cause, and in the war of independence that ensued distinguished themselves by their brilliant exploits.

ARMATURE, n. *ȧr'mă-tūr* [F. *armature*, brace, fencing: L. *armātūra*, armor, equipment—from *arma*, arms]: pieces of soft iron placed at the extremities or poles of magnets to preserve their magnetic power. The term was first used to denote a piece of iron used to close a magnetic circuit, the iron being itself the unmagnetized part of the circuit when not in contact with the other parts forming the circuit. The short flat piece of iron used as a 'keeper' with ordinary horse-shoe magnets is an example. The term is used almost exclusively, however, to denote the part of dynamos in which current is produced or in electric motors the part which receives the main working current. Since in both dynamos and motors, these are the rotating parts, it is customary to call the moving portion of these machines, the armature. See ELECTRICAL MACHINES.

ARMATURE, in botany: the hairs, prickles, etc., covering an organ.

ARMED NEUTRALITY: a term denoting the condition of affairs when a nation not only assumes a threatening position, but maintains an armed force to repel any aggression on the part of belligerent nations between which it is neutral.

ARMENIA, *ȧr-mē'nĭ-a:* a high table-land on the s. slope of the Caucasus, stretching down towards Mesopotamia. It has had different boundaries in the various centuries of its history. It is the original seat of one of the oldest civilized peoples in the world, the Armenians, who belong to the Indo-Germanic family of nations. Their oldest records contain nothing certain beyond the facts that, in ancient times, they were governed by independent kings, but afterwards became tributary to the Assyrians and Medes. That dim period which wavers between myth and history begins, in the case of A., about the middle of the 6th c. B.C., when King Dikran, or Tigranes I. of the Haig dynasty, restored the independence of the kingdom. The last king of this dynasty was slain in battle against Alexander the Great, who conquered the country. After Alexander's death, A. passed through several changes of fortune under the Seleucidæ, who appointed governors over it. Of these, two—Artaxias and Zariadres—made themselves independent of their sovereign, Antiochus the Great, while he was engaged in his contest with the Romans, B.C. 223–190. They divided the province into two districts—Artaxias taking A. Major (that part of the country lying e. of the Euphrates), and Zariadres A. Minor (the part to the w. of that river). The dynasty of Artaxias did not reign long; for about the middle of the 2d c. B.C., we find A. Major in the possession of a branch of the Parthian Arsacidæ, of which the most powerful king was Tigranes the Great, who added to the conquests made by his predecessors in Lower Asia and the region of the Caucasus, Syria, Cappadocia, and A. Minor; defeated the Parthians, and took from them Mesopotamia and other countries. He lost all these territories by his war with the Romans, into which he was led by his father-in-law Mithridates, king of Pontus, B.C. 63. After this, the assaults of the Romans from the w., ever growing more and more vigorous, and those of the Parthians from the e., hastened the downfall of A. Major. The successors of Tigranes became dependent, partly on one nation, partly on the other, while internally the nobles broke through the restraints of a feeble monarchy, and claimed the privileges of petty kings. Under Trajan, A. Major was for a short time a Roman province. Its subsequent history exhibited an unbroken series of tumults and wars, of violent successions to the throne, despotic reigns, and rapid decay. In A.D. 232, the province was conquered by the Sassanides, who held possession of it 28 years, until Tiridates III., the rightful heir, was restored to the throne by Roman assistance.

About this time Christianity became the religion of A., which was thus the first nation to embrace the new religion. Tiridates himself had been converted by St. Gregory the Illuminator as early as about 300. The old religion of Armenia had for its basis the doctrines of Zoroaster, with a curious intermixture of Greek mythology and of ideas peculiar to the country. It is certain that the Armenians worshipped as their mightiest gods Aramazt and Mihir

(the Ormuzd and Mithras of the old Persians); but they had also a kind of Venus, whom they styled Anaitis, and several other deities, to whom they offered animal sacrifices. This change of creed, however, made no improvement in the political circumstances of the falling state. The Byzantine Greeks on one side, and the Persians on the other, regarded A. as their prey; and in 428, Bahram V. of Persia made A. a province of the empire of the Sassanides, and with the deposition of Artasir the dynasty of the Arsacidæ was brought to a close. The rule of the Sassanides in A. was marked chiefly by their sanguinary but unsuccessful attempts to extirpate Christianity. In 632, the unhappy country was subjected to another form of despotism under the Arabian caliphs, and suffered terribly during their contest with the Byzantine emperors. In 885, Aschod I., of an old and powerful Armenian family, ascended the throne, with the permission of the caliphs, and founded the third Armenian dynasty—that of the Bagratidæ. Under them A. was prosperous till the 11th c., when divisions and internal strife began to weaken the country; till at length the Greeks, having murdered the last monarch of the Bagratidæ, seized a part of the kingdom, while the Turks and Kurds made themselves masters of the rest—only one or two of the native princes maintaining a perilous independence. In 1242, the whole of A. Major was conquered by the Mongols, and in 1472 became a Persian province. Afterwards the w. part fell into the hands of the Turkish sultan, Selim II.

The fate of A. Minor was hardly better. The dynasty founded by Zariadres prevailed to the time of Tigranes the Great, sovereign of A. Major, who conquered the country about B.C. 70. Afterwards A. Minor was subjugated by the Romans, and made a Roman province. On the division of the empire into eastern and western, it became attached to the former, and shared in all its changes of fortune until near the close of the 11th c. At this time A. Minor—which had long been a place of refuge for many who had fled from the rage of the Turks and Persians in the sister province—was again raised to independence by Rhupen (a refugee from A. Major, and descendant of the Bagratidæ). His successors extended their dominion over Cilicia and Cappadocia, and were prominent in the Crusades. This dynasty ruled prosperously until 1374, when A. Minor was conquered by the Egyptian sultan Schaban. Since that time A., with the exception of the parts which Russia has won in the present century from Persia, and which are better governed, has remained subject to the despotism of the Turks and Persians. Notwithstanding this, the Armenians have steadily preserved their nationality, both in its physical and moral lineaments; their faith, and even—though only a relic of their ancient culture—a higher civilization than their conquerors. The political storms which devastated the country during the middle ages, and the persecutions of the Turks, have driven many of the inhabitants from their homes. This is the reason why we find them scattered over all Asia and Europe and in recent years in the United States. In Hungary,

Transylvania, and Galicia they number 10,000. They are very numerous in Russia, but most of all in Asia Minor, and in the neighborhood of Constantinople, where they number 200,000.

The greater part of A. is an elevated table-land. Its area is reported at 72,491 sq. m., pop. about 2,472,400. It is watered by the rivers Kur, Aras, Joruk, Euphrates, and to a slight extent by the Tigris. The lakes which lie within this mountainous region are Van, Urumiyah, and Sevan. The Armenian plateau, on the e. side of which the volcanic range of Ararat lifts itself, forms the central point of several mountain-chains, such as Taurus and Antitaurus, the mountains of Kurdistan, and those which run n. to the Black Sea. It shows many traces of volcanic agency, and even yet—as was shown by the severe earthquake of the summer of 1840, and by the total destruction of Erzroum in 1859—has an internal volcanic activity. The climate in the higher regions is hot in summer and cold in winter, but in the valleys it is more temperate. The country labors under a great scarcity of wood, and in some parts is sterile, through a deficiency of water; in other parts the soil is extremely fertile, producing rice, hemp, flax, tobacco, wine, cotton, and many varieties of fruit. Cattle breeding and grazing are more extensive than agriculture. The mountains contain iron, copper, lead, salt, and naphtha. The number of the inhabitants of pure Armenian origin is reckoned at nearly 1,000,000, but there is a large admixture of Turkomans, Greeks, Jews, Kurds, etc. The Armenians belong physically to the finest variety of the Indo-Germanic race. Their intellectual capacity is also remarkable, as is shown both by their literature and their singular dexterity in business. Still, long centuries of oppression have exerted a withering influence on their native strength of character. The n.e. portion of A., about one-third of the whole, was wrested from Persia in 1828, and is under the Russian sceptre. About a sixth part to the s.e. still belongs to Persia. The w. portion, comprising two-thirds of the Armenian area, is Turkish. After the war of 1877–78 between Russia and Turkey, the Berlin Conference sanctioned the cession to Russia of a strip of A., including Kars and Ardahan; and the sultan engaged to carry out in A. much-needed reforms, guarantee the Armenians security against the Circassians and Kurds, and undertook to report to the European powers the measures adopted In 1894–96 terrible atrocities were perpetrated upon the Armenians in the Sasun district. In Harpoot the American and English missions were attacked and several American missionaries were killed, for whose death and property destroyed an indemnity was demanded from Turkey by the United States. A Pan-Armenian Congress met in Brussels 1902, July, and formed a Permanent International Committee to watch over Armenian interests and to promote reform.

ARME'NIAN CHURCH: probably established as early as the 2nd c., at the introduction of Christianity into Armenia, was not firmly established till about the end of the 3d c., when the apostolical exertions of Bishop Gregory (q.v.),

converted Tiridates. See ARMENIA. The Bible was translated into the Armenian language in the 5th c. After this period great animation characterized the A. C. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians held with the Monophysites (q.v.); refused to acknowledge the authority of the Council of Chalcedon; and constituted themselves a separate church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other eastern churches. Their greatest divine is Nerses of Klah, belonging to the 12th c., whose works have been repeatedly published. The most recent edition was issued in Venice, 1833. The Gregorians have continued to entertain a deeply rooted aversion to the so called orthodox church. The Rom. Cath. pope at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognize the papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their peculiar opinions, as we see from the complaint of Pope Benedict XII., who accuses the A. C. of 117 errors of doctrine. There is a sect of *United Armenians* in Italy, Poland, Galicia, Persia, Russia, and Marseilles. Since the formation of this body in 1835, vigorous and constant attempts, succored especially by French influence, have been made to secure the acknowledgment of the pope as the head of the Rom. Cath. portion of the A. C. When this end seemed nearer attainment than ever before, the ultramontane utterances of their representative, Mgr. Hassun, at the Ecumenical Council at Rome, 1870, in favor of infallibility, created such a reaction at home as has greatly strengthened for the present the cause of the old Gregorian party. The recent humiliation of France has further weakened the cause of the propapal party. In theology the A. C. attributes only *one* nature to Christ, and holds that the Holy Spirit proceeds from the Father alone; the latter doctrine, however, being held by it in common with the 'orthodox Greek Church,' although contrary to the theology of the western churches. With respect to the 'seven sacraments,' it entertains the peculiar notions that at baptism one must be sprinkled three times, and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with pure wine and leavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (instead of before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek Church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new. Its sacerdotal constitution differs little from the Greek. The head of the

church, whose title is Catholikos, resides at Etshmiadzin, a monastery near Erivan, the capital of Russian Armenia. To this place every Armenian must make a pilgrimage once in his life. The monks of this church follow the rule of St. Basil. The Wartabieds form a peculiar class of ecclesiastics; they live like monks, but are devoted exclusively to learning. Secular priests must marry once, but none are at liberty to take a second wife. Missionaries from the evangelical churches in the United States have had much success among the Armenians in gathering churches, and establishing schools and colleges.

ARME'NIAN LITERATURE: previous to the introduction of Christianity by Gregory (A.D. 300), the Armenians had adhered to the Assyrian or Medo-Persian system of culture; but excepting a few old songs or ballads, no remains of that early period exist. After their conversion to Christianity, the Greek language and its literature soon became a favorite object of study, and many Greek authors were translated into Armenian. (See Wenrich *De Auctorum Græcorum versionibus Arabicis, Armeniacis*, etc. Leipzig, 1842.) The Armenian language has an alphabet of its own, consisting of 36 letters, introduced by Miesrob in 406. The most flourishing period of A. L. extends from the 4th to the 14th c. The numerous Armenian theological writers and chroniclers of this era supply materials for a history of the East during the middle ages which have hitherto been too much neglected. These Armenian writers generally copied the style of the later Greek and Byzantine authors; but in adherence to facts and good taste, they are superior to the general order of oriental historians. In the 14th c., literature began to decline, and few remarkable works were afterwards produced; but since the time of their dispersion, the Armenians have preserved recollections of their national literature; and wherever they are found—in Amsterdam, Lemberg, Leghorn, Venice, Astrakan, Moscow, Constantinople, Smyrna, Ispahan, Madras, or Calcutta—the printing-office is always a feature in their colonies. The most interesting Armenian settlement is that of the Mechitarists (q.v.), on the island of San Lazaro, near Venice.

The Bible translated into Armenian (the Old Testament from the text of the Septuagint) by Meisrob and his scholars is esteemed the highest model of classic style. Translations of several Greek authors, made about the same time, have been partly preserved and contain some writings of which the originals have been lost—namely, the Chronicle of Eusebius; the Discourses of Philo: Homilies by St. Chrysostom, Severianus, Basil the Great, and Ephraim Syrus. Several old geographical and historical works have been preserved. Among philosophical and theological writers may be mentioned David, the translator and commentator of Aristotle, Esnik, and Joannes Ozniensis. The *Vitæ Sanctorum Calendarii Armeniaci* (Lives of Armenian Saints, 12 vols. Ven. 1814) contains many notices of the history of Armenia. In poetry and fiction, A. L. is poor. The Armenian

belongs to the Indo-Germanic group of languages, but has many peculiarities of structure. It is harsh and disagreeable to the ear. The old Armenian, the language of literature, is no longer a living tongue; while the new Armenian, split up into four dialects, contains many Turkish words and grammatical constructions.

ARMENTIERES, *âr-mŏn-tĕ-ār':* town of the dept. of Nord, France, on the Lys, 8 m. from Lille. The town is well built, active and prosperous, having manufactures of cotton, linen, and hemp, and a considerable trade in grain. A. was formerly famous for its cloth, cheese, and bricks. Pop. (1901) 29,401.

ARME'RIA: see THRIFT.

ARMET, n. *âr'mĕt* [Fr.]: helmet used in the 13th, 14th, and 15th c. ARMET-GRAND, n. an armet worn with a beaver. ARMET-PETIT, armet worn without a beaver. It had a guard for the face consisting of three bars.

ARMFELT, *ârm'fĕlt,* GUSTAF MAURITZ: 1757, Apr. 1—1814, Aug. 19; b. Juva, govt. of Abo; eldest son of Baron A. For services in opposing the machinations of the nobles, while officer of the Swedish royal guard, he was appointed by Gustavus III. to a post in the service of the crown prince. During the war between Sweden and Russia (1788-90), in which he was commander of one of the three divisions of the Swedish army, his courage and spirit advanced him still higher in the good graces of the monarch. He defeated a Russian force at Summa, near Fredrikshamm; and as military representative of Gustavus, had the honor of concluding a peace at Verela, 1790, Aug. 14. Gustavus, after his assassination, 1792, March 16, in the brief interval before his death, added to his will a codicil intrusting the regency to his brother, Charles, Duke of Sudermania, during the minority of Gustavus IV., naming A. governor of Stockholm, and member of the council appointed to advise with the regent. The Duke of Sudermania, however, could not brook a check upon his liberty of action, and found means to destroy the codicil. A.'s influence rapidly decreased. He was rarely permitted to see the young king; and at last, after a secret interview with young Gustavus, departed as ambassador to Naples, 1792, July. While in Italy, he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency, and inducing the states to proclaim Gustavus IV. of age. The correspondence was discovered. A. fled to Poland, afterwards to Russia. He was condemned, during his absence, for high treason, and stripped of his goods and titles, while one of his associates, the beautiful Countess Rudensköld, was subjected to the most brutal punishment, being publicly declared 'infamous,' exposed on a scaffold for some hours, and imprisoned in a house of correction for life. A. expressed his horror of such an atrocity in language sufficiently emphatic, yet, at a later period, he did not scruple to accept office under Charles, on his election to the

throne. In 1799, Gustavus IV. received the crown at the age of eighteen, and A. was restored to all his honors. In 1805, he was appointed gov.gen. of Finland; and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated, that he was compelled to witness the invasion of Sweden by the successful Norwegians, and was in consequence recalled and dismissed by the king. In the following year a revolution took place, Gustavus was deposed, the Duke of Sudermania elected in his place, and A. was appointed president of the Military Council. But shortly afterwards, being implicated in the poisoning of the Prince of Augustenburg, he fled to Russia, where he lived during the remainder of his life in high honor. The title of count was conferred on him, he was made chancellor of the University of Abo, president of the board of Finnish affairs, and member of the Russian senate. He died at Tzarskœ Selo, 1814, Aug. 19.

ARMIDA, *ar-mē'dă:* one of the most prominent female characters in Tasso's *Jerusalem Delivered.* As the poet tells us, when the Crusaders arrived at the holy city, Satan held a council to devise some means of disturbing the plans of the Christian warriors, and A., a very beautiful sorceress, was employed to seduce Rinaldo and other Crusaders. Rinaldo was conducted by A. to a remote island, where, in her splendid palace, surrounded by delightful gardens and pleasure-grounds, he utterly forgot his vows, and the great object to which he had devoted his life. To liberate him from his voluptuous bondage, two messengers from the Christian army—Carlo and Ubaldo—came to the island, bringing a talisman so powerful that the witchery of A. was destroyed. Rinaldo escaped, but was followed by the sorceress, who, in battle, incited several warriors to attack the hero, and at last herself rushed into the fight. She was defeated by Rinaldo, who then confessed his love to her, persuaded her to become a Christian, and vowed to be her faithful knight. The story of A. has been made the subject of an opera by Gluck and by Rossini.

ARMIES: armed forces under regular military organization, employed for war. An army may comprise all the military men employed by the state, or only a portion under a particular commander. When an armed force is under no constituted authority, and imperfect in organization and discipline, it cannot be said to be worthy of the name of an army, and may be little better than a horde of banditti. Of this nature are *filibusters* (q.v.). Through ages of experience, the principles of military organization, and the laws to which A. are specially amenable, have gradually reached a high degree of perfection. The primitive wars among barbarous people are always stealthy, depending on the forest and the wilderness for their tactics, and considered successful if an enemy can be attacked unawares, despoiled, and carried into slavery. After a time, war advances to the position of an art, and is conducted by men who have received a certain training. An army becomes an instrument not only for vanquishing enemies, but for seizing countries. Even then the highest position of an army is not reached; for the defense of a country requires more military skill, perhaps, and a better organization of troops, than an attack. See ARMY (various titles): also ARMOR: ARMS.

ANCIENT ARMIES—*Egyptians.*—The most extraordinary conqueror among the Egyptians, Sesostris or Rhamses, lived sixteen centuries before the Christian era; and although the evidence for his deeds of valor is questionable, there is reason to believe that the organization of his A. can be pretty accurately traced. His father, Amenophis, laid the foundation for the military glory of Sesostris. When the latter was born, Amenophis caused all the male children who were born on the same day as his son to be set apart as a special body, to be reared for a military life; they were taught everything that could strengthen their bodies, increase their courage, and develop their skill as combatants and leaders; and were to consider themselves bound as the chosen dependents or companions of the young prince. In due time Sesostris became king of Egypt; and then he formed a sort of militia, distributed as military colonists, each soldier having a portion of land to maintain himself and his family. When this militia had been drilled to military efficiency, Sesostris headed them as an army for military conquest in Asia, and placed the chosen band above mentioned as officers over the different sections of the army.

Persians.—In the great days of the Persian empire, the flower of the army consisted of cavalry, who were distinguished for their bravery and impetuosity of attack. The infantry were little better than an armed mob. The war-chariots, too, though calculated to strike terror when dashing into hostile ranks, were available only on level ground. As to the numbers of men composing the great Persian A., the statements are too wild to be trustworthy. Allowing for all exaggeration, however, it is certain that the Persian A. were very large. When Darius was opposed to Alexander the Great, his army was set down at various

numbers—from 750,000 to 1,000,000 men. The king was in the centre, surrounded by his courtiers and body-guard; the Persians and Susians were on the left; the Syrians and Assyrians on the right. The foot-soldiers, forming the bulk of the army, and armed with pikes, axes, and maces, were formed in deep squares or masses; the horsemen were in the intervals between the squares, and on the right and left flanks; and the chariots and elephants in front.

Lacedæmonians.—The Greeks introduced many important changes in A., both in organization and in maneuvers. Every man, in the earlier ages of the country at least, was more or less a soldier, inured to a hard life, taught to bear arms, and expected to fight when called upon. The leading men in each state paid attention to organization and tactics in a way never before seen. It was not standing armies, but a sort of national militia, that gained Marathon, Platæa, and Mycale. So far as concerned the arrangement of A., the Lacedæmonians invented the *phalanx* (q.v.), a particular mode of grouping foot-soldiers. This phalanx consisted of eight ranks, one behind another; the front and rear ranks being composed of picked men, and the intermediate ranks of less tried soldiers. The number of men in each rank depended on the available resources of the commander. These men were mostly armed with spears, short swords, and shields.

Athenians—The Athenians made a greater number of distinctions than the Lacedæmonians in the different kinds of troops forming their A. They had heavy infantry, constituting the men for the phalanx, and armed with spears, daggers, corselets, and shields; light infantry, employed in skirmishes and in covering the phalanx, and armed with light javelins and shields; a sort of irregular infantry, who, with javelins, bows and arrows, and slings, harassed the enemy in march, and performed other services analogous in some degree to those of sharpshooters in a modern army. It is recorded that Miltiades, the Athenian hero at Marathon, invented the 'double-quick march,' to increase the momentum of a phalanx when rushing on the enemy.

Macedonians.—Philip of Macedon, the father of Alexander the Great, having the sagacity to see that he could not vanquish his neighbors so long as he adopted the same formation and tactics as themselves, set about inventing something new. He resolved to have a standing army instead of a militia; to have at command a set of men whose trade was fighting, instead of citizens who were traders and soldiers by turn. As a further change, he made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 ft. in length. With a phalanx sixteen ranks in depth, four rows of men could present the points of their long pikes protruding in front of the front-rank, forming a bristling array of steel terrible to encounter. Besides these heavy infantry, there were light troops marshalled into smaller bodies for more active maneuvers. Philip organized three kinds of cavalry—heavy, armed with

pikes, and defended by cuirasses of iron mail; light, armed with lances; and irregular.

Thebans.—This nation introduced the army-formation of *columns*, much deeper than broad, or having more men in file than in rank. A new kind of tactics was introduced in accordance with this formation; the movement being intended to pierce the enemy's line at some one point, and throw them into confusion.

Romans.—These able warriors initiated changes in army matters, which had wide influence on the nations of the civilized world. About 200 B.C., every Roman, from the age of 17 to 46, was liable to be called upon to serve as a soldier; the younger men were preferred; but all were available up to the middle-time of life. They went through a very severe drilling and discipline, to fit them alike for marching, fighting, camping, working, carrying, and other active duties. Every year the senate decreed the formation of *legions*, or army corps, deputing this duty to the consul or pretor. Magistrates sent up the names of eligible men, and tribunes selected a certain number from this list. See LEGION. The Roman legion, in its best days, had many excellent military qualities—great facility of movement; a power of preserving order of battle unimpaired; a quick rallying-power when forced to give way; a readiness to adapt itself to varying circumstances on the field of battle; a formidable impetuosity in attack; and a power of fighting the enemy even while retreating. The heavy infantry were armed with javelins, heavy darts, pikes, and swords; the lighter troops with bows and arrows, slings, and light javelins; while the defensive armor comprised shields, cuirasses, helmets, and greaves.

Those ancient nations which had no distinctive features in their A. are not noticed here.

MEDIÆVAL ARMIES.—The downfall of the Roman empire marked the dividing-point between ancient and mediæval times in military matters, as well as in other things that concern the existence of nations. The barbarians and semi-barbarians, who attacked on all sides the once mighty but now degenerate empire, gradually gained possession of the vast regions which had composed it. The mode in which these conquests were made gave rise to the *Feudal System* (q.v.). What all had aided to acquire by conquest, all demanded to share in proportions more or less equal. Hence arose a division of the conquered territory; lands were held from the chief by feudal tenure, almost in independent sovereignty. When European kingdoms were gradually formed out of the wrecks of the empire, the military arrangements took on a peculiar form. The king could not maintain a standing army, for his barons or feudal chieftains were jealous of allowing him too much power. He could only strengthen himself by obtaining their aid on certain terms, or by allowing them to weaken themselves in intestine broils, to which they had always much proneness. Each baron had a small army composed of his own militia or retainers, available for battle at short notice. The contests of these

small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the middle ages. Of military tactics or strategy, there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valor than by any well-concerted plan.

One great exception to this military feudality was furnished by the *Crusades* (q.v.). So far as concerns A., however, in their organization and discipline, these expeditions effected but little. The military forces which went to the Holy Land were little better than armed mobs, upheld by fanaticism, but not at all by science or discipline. Numbers and individual bravery were left to do the work, combination and forethought being disregarded.

A much greater motive-power for change, during the middle ages, was the invention of gunpowder. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valor, everything connected with the military art underwent a revolution. Historically, however, this great change was not very apparent until after the period usually denominated the middle ages. The art of making good cannon and hand-guns grew up gradually, like other arts; and A. long continued to depend principally on the older weapons —spears, darts, arrows, axes, maces, swords, and daggers.

During the greater part of the 14th and 15th centuries, the chief A. were those maintained by the Spaniards and the Moors on one European battle-ground, by the English and the French on another, and by the several Italian republics on a third. In those A., the cavalry were regarded as the chief arm. The knights and their horses alike were frequently covered with plate or chain armor; and the offensive weapons were lances, swords, daggers, and battle-axes. A kind of light cavalry was sometimes formed of archers on smaller horses. As to army-formation, there was still little that could deserve the name; there was no particular order of battle; each knight sought how he could best distinguish himself by personal valor; and to each was usually attached an esquire, abetting him as a second during the contest. Sometimes it even happened that the fate of a battle was allowed to depend on a combat between two knights. No attempt was made, until towards the close of the 15th c., to embody a system of tactics and maneuvers for cavalry; and even that attempt was of the most primitive kind. Nor was it far otherwise with the foot-soldiers; they were gradually becoming acquainted with the use of firearms; but, midway, as it were, between two systems, they observed neither completely; and the A. in which they served presented very little definite organization.

Modern Armies.—The formation of *standing* armies may be said to have introduced the modern military system. When the remarkable exploit of Jeanne d'Arc (Joan of Arc) had enabled Charles VII. to check the victorious progress of the English in France, he set about remodelling his army. By gradual changes, amid

great difficulty, he converted his ill-governed forces into a disciplined standing army. During the reign of his son, Charles VIII. (1483–98), the consequences of this change made their appearance. Charles conducted a well-appointed army into Italy (1494), in support of some pretensions which he had to the throne of Naples.

The change made by Charles VII. was not simply that of substituting a compact standing army for an ill-organized medley of feudal troops and of mercenaries; feudalism itself gave way under the influence of this combined with other reforming agencies. So far as concerned the actual formation and discipline of the standing A. above noticed, a few changes were from time to time introduced: pistols and carbines were given to the cavalry; cuirasses were worn by the heavy troopers; and new evolutions were introduced. During the Thirty Years' War (1618–48), Gustavus Adolphus and Wallenstein adopted opposite modes of dealing with masses of infantry: the former spread them out to a great width, and only six ranks in depth; whereas the latter adopted a narrower front, with a depth of twenty to thirty ranks. Frederick the Great, in the next century, introduced a most complicated system of tactics and drilling; insomuch that when he could maneuver, he nearly always won his battles; but when the result depended on bold and unexpected onslaughts, he was more frequently a loser than a winner. The great military leader in the early part of the present century, Napoleon Bonaparte, made a larger use than any previous European general of the method of moving masses of troops with great celerity, beating the enemy in detail before they could combine in one spot.

It is desirable to present, in the most condensed form, a few statistics of the actual A. of Europe; leaving to titles of the several countries, cities, and battle-fields, all details concerning special armies and military encounters.

The army forces of all the countries of the world 1903 were as follows.

Argentine Republic: 20 generals, 276 field officers, 880 subalterns, 238 engineers, 789 artillerists, 2,227 horse, 2,321 foot—total 5,585 combatants. Militia 236,000 men of 17–45 years. There was a milit. school with 125 cadets, and a school for non commissioned officers.

Austria-Hungary: on peace footing, inf. 240,461, cav. 55,387, artil. 40,401, technical troops 10,148, train 3,906, sanitary 4 698, higher officers 4,394, establishment, etc., 15,501—total 374,148. On the war footing the total strength was 2,580,000. The yearly contingent of recruits for the army amounted to 103,100. Milit. service begins at 21 years, and the men serve 3 years in the line and 7 years in the reserve. Horses (peace) 66,758, (war) 332,000.

Belgium: (peace) inf. 29,709, cav. 6,140, artil. 9,315, engineers 1,855, gendarmerie 3,144, gen. staff, train, administrative, milit. school, etc., 1,481—total 51,644; horses, 10,908. War footing, 143,000 men, 28,600 horses. Beside

the army, there was a 'civic guard' organized in communes of 10,000 inhabitants.

Bolivia: 2,560 men, 140 officers in actual service: all citizens are bound to serve in the 'national guard.'

Brazil: (1891) 28,877 men, 1,600 officers, 20,000 gendarmerie.

British Empire: regular army (exclusive of India) 9,975 commissioned officers, 1,510 warrant officers, 20,050 sergts., 4,542 drummers, fifers, etc., 183,623 rank and file—total 219,700; horses, 26,303. The organized milit. forces of colonies, dependencies, etc., of Great Britain were as follows: *Honkong,* 4,437 (colonial 2,364). *India* (European army), 74,328 officers and men; (native army), 147,552—total 221,880. *Straits Settlements* (for the Straits Settlements and all other colonies and dependencies only the local forces are enumerated here. The imperial forces are included in the total for the whole empire), armed police force of 2,751, volunteer artil. 105 officers and men. *Cape Colony,* mounted riflemen, 1,003, Cape police, 1,952, 609 horses; every able-bodied man 18–50 years old is subject to milit. service both beyond as well as within the colonial limits. *Zanzibar,* 900 men. *Canada,* volunteer force of 38,090 officers and men. *Jamaica,* volunteer militia 1,741. *New South Wales,* regular milit. force 688, 5,194 volunteers, 3,063 reserves. *New Zealand,* volunteers, 20,230, permanent militia artil. force of 216 officers and men; all males of 17–55 years liable to serve in the militia. *Queensland,* drilled force of 4,976 men; males 18-60 years are subject to milit. duty. *S. Australia,* militia force of 2,318, and volunteers 777, artil. corps 52. *Tasmania,* volunteers 2,430 officers and men. *Victoria,* organized force of 11,817. *W. Australia,* volunteer force of 2,125 officers and men.

Bulgaria: see *Turkish Empire.*

Canada: see *British Empire.*

Cape Colony: see *British Empire.*

Chile: 2 regts. artil., 1 battalion coast artil., 1 of sappers, 8 of inf., 3 of cav.—total 17,385 officers and men; national guard 48,530.

China: men of all arms 980,000.

Colombia, Republic of: peace footing 1,000 men. Every able-bodied man liable to milit. service.

Costa Rica: 600 men; militia 12,000 men.

Denmark: total war strength 60,134, exclusive of the extra reserve, numbering 16,500.

Dutch East Indies: see *Netherlands.*

Ecuador: 3,341 officers and men; national guard 30,000.

Egypt: see *Turkish Empire.*

France: in the active home army there were 513,998 officers and men, of whom 489,392 were in the regular army, the rest in the gendarmerie and the garde republicaine; there were 126,155 horses. The army of *Algeria* comprised 53,761 regular troops, 1,013 gendarmerie, and the number of horses is 12,737. In *Tunis* were 18,371 men in the regular army, 143 in the gendarmerie; horses 3,931. Total men and officers at home and in Algeria and Tunis

587,286 men and officers, and 142,823 horses. The territorial army numbered 37,000 officers and 579,000 men. All these forces, with the reserves, amount to about 2,500,000 soldiers; and including all able-bodied men, France could reckon on a grand total of 4,350,000 men (see FRANCE).

German Empire: The peace strength is as follows: Officers, 23,844; noncommissioned officers, 80,556; privates, lance-corporals, etc., 495,500; volunteers, 9,000; total, 608,900. There are over 3,000,000 trained men available for service, excluding Landsturm. In the Ersatz Reserve and Landsturm the number is 4,800,000, of whom 800,000 have been trained. In time of peace the organization of the army comprises 625 battalions of infantry, 482 squadrons of cavalry, 574 batteries of field horse artillery, 38 battalions of foot artillery, 26 battalions of pioneers, 8 battalions of railway troops, 3 battalions of telegraph troops, 23 battalions of train troops. In war time the army is divided into field troops, field reserve troops, Landwehr troops, depot troops, and Landsturm troops. For requirements and terms of service and equipments of troops, see GERMANY.

To this grand total of men and officers add railroad staff and special services and (in case of invasion) the landsturm (700,000), and the result falls little short of 3,000,000 men (see GERMANY).

Great Britain and Ireland: see *British Empire.*

Greece: standing army of 22,104 officers and men, and 3,227 horses. The reserves numbered 82,000, and the territorial army 96,000 men.

Guatemala: army of 3,718 officers and men, the reserve militia had 67,300.

Haiti: regular army of 6,828 officers and men; there was also a 'guard of the govt.,' numbering 650 men, commanded by 10 generals.

Honduras: active army of 500 men; the militia numbered 20,000.

India: see *British Empire.*

Italy: under arms 261,976 officers and men, and 486,290 officers and men 'on permanent leave;' the 'mobile' militia numbered 320,170, and the 'territorial' 2,285,875, grand total 3,356,920.

Japan: peace strength, 8,046 officers, 158,214 rank and file, 31,057 horses; the reserve had a strength of 204,109, and the landwehr of 98,722 men.

Kongo Free State: authorized force, 13,650 natives, commanded by European officers.

Madagascar: standing army estimated at 15,697 officers and men.

Mexico: total strength 32,143 officers and men. The effective reserve force was stated to be 120,500 inf., 20,000 dragoons, 6,000 artil. All men capable of bearing arms, 20–50 years old, were subject to milit. service.

Monaco: no army, only a 'guard of honor'—75 men and officers.

Montenegro: law requires that all men 17–60 years old, capable of bearing arms, be trained as soldiers, and they are liable to milit. service.

Morocco: about 10,000 inf. soldiers and 400 cav., beside 2,000 irregular cavalry.

Netherlands: regular army of about 27,366 officers and men. In the *Dutch East Indies* the army is pure colonial, and numbers about 38,165 officers and men.

Nicaragua: active army of 2,000 men, with a reserve of 10,000 and national guard of 5,000.

Norway: active army of about 50,000 men, reserve included.

Orange River Colony. no standing army, but every able-body man is compelled to take up arms when necessity demands it.

Paraguay: army comprised 82 officers, 1,500 men. Men aged 20–35 years are liable to milit. service.

Persia: milit. establishment comprised 105,500 men, but of these less than 25,000 were in active service.

Peru: total force 4,000 men.

Portugal: standing army of 33,068 officers and men. In Portuguese colonies there is an army of 8,880 officers and men.

Roumania: peace establishment 3,280 officers, 388 employés, 60,000 men, 11,930 horses; territorial army comprised 72,000 men, 7,500 horses.

Russia: army on peace footing numbered (regular troops) 1,314,298, with 172,445 horses; (Cossacks) 58,500 with 45,500 horses; militia 3,500 with 3,000 horses—grand total 1,386,810 officers and men. On the war footing the strength in men was 4,600,000, and in horses 562,000.

Salvador: army of 4,000 men and 25,000 militia.

Santo Domingo: small army of inf., cav., and artillery.

Servia: standing army about 22,448 men; the three classes of reserves raise the milit. strength to 300,000 men.

Siam: small standing army; all male inhabitants are required to serve the state in camps three months in each year.

South African Republic: only a small force of horse artil.; the able-bodied men liable to milit. duty numbered about 40,000.

Spain: army on peace footing nnmbered 119,432, on war footing 213,972.

Sweden: standing army of 37,200 officers and men, 9,808 horses.

Switzerland: army divided into three classes, viz.; élite 153,649, landwehr about 88,813, landsturm about 283,643; in the élite were enrolled all men aged 20–32 years capable of bearing arms; in the landwehr all 32–44 years; in the landsturm all citizens not otherwise serving aged 17–50 years.

Turkish Empire: milit. service required of all the Mussulman population: strength of the active army about 9,000 officers and 205,000 men. Among the tributary states *Bulgaria* had an army of 35,800 men on peace footing, and 125,000 on war footing. *Egypt's* army numbered about 18,068 men.

United States: regular army numbered (1901, Feb.) 100,000 officers and men. The organized militia (or 'national

guard of the several states) numbered nearly 2,000 officers and 183,596 men. All men aged 18–45 years are liable to do milit. duty at the call of the president. The number of males of milit. age (1900) was 16,360,363. See UNITED STATES ARMY.

Uruguay: standing army of 3,504 officers and men, an armed police of 3,200, and an active civilian force of 97,000.

Venezuela: standing army numbered 9,000 men.

ARMIGER, n. *âr'mĭ-jĕr* [L. *armĭger*, bearing or carrying weapons—from *arma*, arms; *gero*, I carry]: in *her.*, esquire; one with a right to armorial bearings. ARMIGEROUS, a. *ăr-mĭj'ĕr-ŭs*, bearing arms.

ARMIL, n. *ârm'ĭl* [L. *armilla*, a bracelet—from *armus*, the arm]: an ancient astronomical instrument consisting of one, two, or more rings placed in the plane of the equator, or in the plane of the meridian; a kind of a sun-dial.

ARMILAUSA, n. *âr-mĭ-law'za* [L. *armiclausa*, a military cloak]: cloak covering the shoulders, worn in England in mediæval times.

ARMILLA, n. *âr-mĭl'lă* [L. *armil'la*, an ornament for the arm, a hoop]: in *mech.*, an iron ring, hoop, or brace; in *anat.*, the circular ligament of the hand. ARMILLATED, a. *âr'mĭl-lā-tĕd*, wearing bracelets. ARMILLARY, a. *âr'mĭl-lĕr-ĭ*, consisting of rings or circles; applied to an artificial sphere composed of a number of circles or movable rings; appearing in the form of several rings or bracelets put together in due position. The ARMILLARY SPHERE is an instrument intended to give a just conception of the constitution of the heavens, and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahé making most of his planetary observations with the help of such an instrument. It is, however, now used only as an aid to instruction in astronomy, and in this respect is generally supplanted by the celestial globe. The object of the Armillary Sphere will be better understood by reference to the celestial globe in the diagram. Supposing the observer on the earth to be in the centre of the sphere, the earth on which he stands shuts out from his view the lower half of the heavens, or the part lying below the horizon, HH. The hemisphere above him may be regarded as divided into two equal portions, an eastern and a western, by the meridian, MM, which passes through the pole, P, and the zenith, Z, of which the eastern half is shown in the figure. The north pole is supposed to be elevated above the horizon, and its elevation is measured by the arc NP, or the height above the north point; and the heavens appear to rotate round an axis, PQ, of which P is one extremity; the south pole, Q, the other extremity.

being below the horizon. The meridian MM, and the horizon HH, are the only circles which maintain a fixed position with regard to the observer. Of the other leading

celestial circles, the equator or equinoctial, LL, extending from the east to the west point of the horizon, the tropics of Cancer and Capricorn, respectively BB and CC, and the Arctic circle, AA, although rotating with the stars, maintain the same position with regard to the horizon; while the ecliptic, KK, is constantly changing its inclination and position towards it. Circles which extend from pole to pole, cutting the equator at right angles, are called circles of declination. The circle which passes through the vernal equinox ♈ (see ARIES), is denominated the equinoctial colure; and that passing through the summer solstice, O (see SOLSTICE), the solstitial colure. The circles just named, together with the Antarctic circle, are represented by corresponding rings in the Armillary Sphere. If S be a star, the following are the names given to the arcs which determine its position with regard to these circles: ♈V, Right ascension; SV, Declination; SP, Polar distance; SZ, Zenith distance; XS, Altitude; (XN + 180°), Azimuth, reckoned from the south pole westward.

ARMINIAN, n. *ȧr-mĭn'ĭ-ăn* [from *Armin'ĭŭs*] one who holds the doctrines of Jacobus Arminius (q.v.): ADJ. pertaining to the doctrines of Arminius. ARMIN IANISM, n. *-ĭ-ăn-ĭzm*, the peculiar doctrines of Arminius (q.v.).

ARMINIUS: famous German hero: 6th c.: see HERMANN, or HERMAN.

ARMINIUS, *ár-mĭn'ĭ-ŭs,* JACOBUS, the founder of Arminianism: 1560–1609, Oct. 19; b. at Oudewater (Old Water). His real name in Dutch was James Harmensen; but in accordance with the prevailing custom among scholars in those days, he latinized it. His father was a cutler, and died when A. was a child. After a preliminary education at Utrecht, he commenced (1575) a course of study at the newly founded Univ. of Leyden, where he remained for six years, and where he seems to have acquired a high reputation, for the Amsterdam merchants undertook to bear the expense of his further studies for the ministry, on condition that he would not preach out of their city unless permitted to do so. In 1582, he went to Geneva, and received the instructions of Theodore Beza, the most rigid of Calvinists. Here he made himself odious by the boldness with which he defended the logic of Peter Ramus, in opposition to that of the Aristotelians of Geneva, and in consequence had to retire to Basle, whither his fame must have preceded him, for he was offered by the faculty of divinity in that univ. the degree of doctor gratis, which, however, he did not venture to accept, on account of his youth. At Basle he studied under Gyrnæus. He subsequently (1586) travelled into Italy. On his return to Amsterdam (1588), he was appointed minister. Shortly after this, he was commissioned to defend the doctrine of Beza, regarding predestination, against the changes which the ministers of Delft had proposed to make on it. A. carefully examined both sides of the question, but the result of his study was that he himself began to doubt, and at last came to adopt the opinions he had been commissioned to confute. Some time after this change of view, he came, in the course of his expositions, to the Epistle to the Romans, the most explicitly doctrinal in the New Testament, the 8th and 9th chapters of which have always been considered the strongholds of Calvinism. His treatment of this epistle excited much dissatisfaction, and involved him in sharp disputes with his orthodox brethren. Still his views were, as yet, either ambiguously or vaguely expressed, or, at least, had not attained consistency, for in 1604 he was made professor of theology in the Univ. of Leyden.

The greatest enemy of A. was Francis Gomar, his colleague in the Univ. of Leyden. In the course of the year 1604, the latter attacked his doctrines, and from that hour to the end of his life, A. was engaged in a series of bitter disputes with his opponents. The *odium theologicum* was perhaps never exhibited in more unmingled purity. Arminius asserted, in substance, that God bestows forgiveness and eternal life on all who repent of their sins and believe in Christ; he wills that all men should attain salvation, and only because he has from eternity foreseen the belief or unbelief of individuals, has he from eternity determined the fate of each. On the other hand, Gomar and his party, appealing to the Belgic Confession and the Heidelberg Catechism, maintained that God had, by an eternal decree, predestinated what persons shall, as

being elected to salvation, be therefore awakened to repentance and faith and by grace made to persevere therein; and what persons shall, as being rejected (*reprobati*), be left to sin, to unbelief, and to perdition. See PREDESTINATION: PERSEVERANCE OF SAINTS.

While these fierce disputes were continuing, A. who was not destitute either of friends or influence, was made *rector magnificus* of the univ., but resigned the honor, 1606, Feb. 8, having held the office only one year. All the pulpits in Holland now fulminated against him. At length, 1608, A. himself applied to the states of Holland to convoke a synod for the purpose of settling the controversy; but, worn out with care and disease, he died before it was held, leaving seven sons and two daughters by his wife, Elizabeth Reael, daughter of Laurent Reael, a judge and senator of Amsterdam.

There can be no doubt that A. himself was much less Arminian than his followers. He had not matured his opinions sufficiently to elaborate a complete system of anti-Calvinistic doctrine, though it is perfectly certain that the conclusions at which his disciples arrived—as stated in the famous 'Five Articles'—are the logical and legitimate results of his teaching. He always complained, however, that his opinions were misrepresented; but this is invariably the fate of controversialists, and the penalty of controversy. A. was an extremely good man, as even his enemies allow; his abilities were also of a high order; his thinking is clear, bold, and vigorous; his style remarkably methodical, and, his scholarship respectable, even though not profound.

After the death of A., his followers gained strength, and boldly asserted their views, but still remained a minority. In 1610, they presented to the assembled states of the province of Holland a 'Remonstrance'—from which they were styled 'Remonstrants'—which contained the following propositions: 1. That God had indeed made an eternal decree, but only on the conditional terms that all who believe in Christ shall be saved, while all who refuse to believe must perish; so that predestination is only conditional. 2. That Christ died for all men, but that none except believers are really saved by his death. The intention, in other words, is universal, but the efficacy may be restricted by unbelief. 3. That no man is of himself able to exercise a saving faith, but must be born again of God in Christ through the Holy Spirit. 4. That without the grace of God, man can neither think, will, nor do anything good; yet that grace does not act in men in an irresistible way. 5. That believers are able, by the aid of the Holy Spirit, victoriously to resist sin; but that the question of the possibility of a fall from grace must be determined by a further examination of the Scriptures on this point.

This last point, left as an open question, was decided by the Remonstrants in the affirmative soon afterwards (1611). Whereupon the Gomarists (Calvinists) put forth a strong 'Counter-remonstrance,' asserting plainly absolute predestination and reprobation. After several fruitless discus-

sions, the states of Holland, 1614, Jan., acting under the advice of Oldenbarneveld, a senator, and the learned Hugo Grotius, issued an edict of full toleration for both parties, prohibiting at the same time the continuance of the controversy. The Counter-remonstrants (or Calvinists) refused to submit to this edict, and the strife soon became so furious that in 1617, or soon afterwards, the Arminians found it necessary to guard themselves from personal violence by appointing a safeguard of militia-men (*Waardgelders*). The controversy now merged in the strife of party politics. The ambitious Maurice of Orange took advantage of the passions of the majority to crush his opponents of the republican party, whose leaders were adherents of the Arminian doctrines. Several Arminians were put to death—among them the aged senator Oldenbarneveld, 1619, May 13—while Grotius and others were imprisoned. In these circumstances, the Synod of Dort was held (1618–19), attended by selected representatives from the Netherlands, England, Scotland, the Palatinate, Switzerland, Nassau, East Friesland, and Bremen. From this convocation, 1619, Jan. 14, the thirteen Arminian pastors, with the learned and eloquent Simon Episcopius at their head, were excluded. The doctrines of the Counter-remonstrants were embodied in 93 canons; the Belgic Confession and the Heidelberg Catechism were confirmed as authorities for the reformed churches of the Netherlands; and 300 Arminians (chiefly preachers) were expelled from office. In consequence of this decision, the defeated party sought shelter in France, Holstein, England, etc. Afterwards, under Frederick Henry, the stadtholder after Prince Maurice (1630), they were again tolerated in Holland, and in 1634 Episcopius opened his theological college in Amsterdam.

Since that time, the Remonstrants (or Arminians) in Holland have inclined more and more towards freedom of thought on religious questions and independence in church government. The rejection of all creeds and confessions; the free interpretation of the Scriptures; a preference of moral to doctrinal teaching; Arian views respecting the Trinity; the virtual rejection of the doctrines of original sin and imputed righteousness, and the view of the sacraments as merely edifying forms or ceremonies: all these and other points of belief display the same tendency which is found in their church polity. Their annual conference on ecclesiastical affairs is composed of ministers and lay-deputies, and meets in June, alternately at Amsterdam and Rotterdam. The number of Remonstrants is now only about 5,000, and is decreasing. In 1809, they had 34 congregations with 40 preachers in Holland; but in 1880, only about 20 congregations. The largest society of Arminians is in Rotterdam, and numbers only 600 members.

Although the Arminians are thus dwindling away as a distinct body, their tenets respecting predestination have been adopted with greater or less modification by several great modern Christian denominations (see METHODISTS: BAPTISTS); as well as by multitudes of the individual mem-

bers of those churches whose formularies are Calvinistic. See CALVINISM. They are also very prevalent in the Church of Rome.

ARMIPOTENCE, n. *âr-mĭp'ŏ-tĕns* [L. *arma*, weapons of war; *potens*, powerful]: power in arms. ARMIP'OTENT, a. powerful in arms.

ARMISONANT, a. *âr-mĭs'ŏ-nănt*, or ARMISONOUS, a *âr-mĭs'ŏ-nŭs* [L. *arma*, arms; *sonans*, sounding]: having sounding arms, or rustling armor.

ARMISTICE, n. *âr'mĭs-tĭs* [F. *armistice*—from L. *arma*, arms; *sisto*, I stand still]: a cessation from hostilities between armies, or nations, for a short time; a truce. It sometimes takes place when both sides are exhausted, and at other times when an endeavor to form a treaty of peace is being made. A particular example will best illustrate the nature of an A. The representatives of England, France, Austria, Prussia, Sardinia, Turkey, and Russia, met in congress at Paris, 1856, Feb. 25, to consider the terms of a treaty of peace, which should terminate the 'Crimean' between five of the powers. It was agreed at the first sitting that an A. should be declared, to be announced by telegraphic message to the commanders in the Crimea, and to last until Mar. 31. During that period of about one calendar month, the hostile armies were to remain strictly at peace, though the fleets of the allies were to continue their blockade of Russian ports. The information reached the generals late on Feb. 28. On the morning of the 29th, a white flag was hoisted in the Russian camp outside Sebastopol; several Russian officers assembled around it; and a glittering cavalcade of British, French, and Sardinian officers proceeded thither. The accredited officers compared notes, found the terms of the A. clear, agreed on a boundary-line between the hitherto hostile forces, and formally gave pledges for a cessation of fighting. The courtesy of civilized nations at once succeeded to the horrors of war; the Russian commander gave a magnificent entertainment to the allied commanders, and was entertained in turn; the soldiers 'fraternized,' by little gifts of tobacco, and ludicrous attempts at conversation, across a small stream which formed part of the boundary-line. The A. ended Mar. 31 with a treaty of peace.

ARMITAGE, *âr'mĭ-tĕj*, THOMAS, D.D., LL.D.: Baptist minister: b. Pontefract, England, 1819, Aug. 2. He was a Wesleyan preacher from his youth, but came to New York 1838 and joined the Meth. Episc. Church. Ten years later he entered the Bapt. denomination and became pastor of the 5th Ave. Bapt. church, New York. He became eminent and popular as a preacher and orator, and at the same time widely known as one of the leading theological writers. He was one of the founders of the American Bible Union, and at one time its pres. He interested himself deeply in the revision of the Scriptures. In 1889 he retired from his pastorate. He wrote *Lectures on Preaching: Its Ideal and Inner Life* (1880); and *A History of the Baptists* (1886). He died 1896, Jan. 20.

ARMOR, or ARMOUR, n. *âr'mėr* [OE. *armure;* F. *ar mure;* OF. *armeure,* armor—from L. *armatūra,* armor, equipment—from *arma,* arms]: dress for war made of iron or steel; weapons of war. ARMORER or ARMOURER, n. *âr-mėr-ėr,* one who makes weapons of war. ARMORIAL, a. *âr-mō'rĭ-ăl,* belonging to arms; pertaining to coats of arms; heraldic. AR'MORIST, n. one skilled in heraldry. ARMORY, or ARMOURY, n. *âr'mŏ-rĭ,* a place where weapons of war are kept, or where they are made; a storehouse for arms; a collection of ancient armor and weapons—such as those in the Tower of London, in Sir Samuel Meyrick's mansion at Goodrich Court on the Wye, and in Warwick Castle. The term is applied also to armorial bearings. AR'MOR-BEARER, one who carries the arms of a soldier of rank. AR'MOR-PLATED, a. *-plā-tĕd,* covered with defensive plates of metal, as ships of war. ARMOR is a general name for the apparatus for personal defense as contradistinguished from arms or weapons of offense. Little of it is worn by soldiers at the present day, as hand-to-hand conflicts, in which it is especially serviceable, are not the common mode of modern warfare. It was before the invention of gunpowder that A.—often called in England *harness*—was especially used.

All the ancient nations who occupy a place in history were accustomed to adopt one or other of the defensive clothing or implements which collectively come under the denomination of A. Leather A. was sometimes worn; but brass, iron, and other metals were preferred. Some of the more luxurious leaders had much silver and gold in their A. In the Bible, shields, helmets, breastplates, and greaves are mentioned among the articles of A. borne or worn by the Israelites and their opponents. The classical writers—Homer, Xenophon, Herodotus, Livy, Tacitus, Varro, etc.—supply abundant evidence of the use of A. among the nations concerning whom they wrote.

It is believed that the early Britons bore little or no other A. than shields. The Anglo-Saxons were more fully provided. At different times before the Norman Conquest they appear to have had four-cornered helmets; loricæ made of leather; scale-A.; leathern helmets; wooden shields covered with leather; sheep-skin shields; conical caps or helmets of metal; pectorals or neck-guards; breast-guards of undressed hide; flat-ringed A.; byrnes or tunics of overlapping pieces of leather; close-fitting cuirasses of leather, and sometimes of strong linen; leg-guards of twisted woolen cloth; shields of various sizes, from half a yard to a yard and a half in length; and casques having more or less resemblance to the ancient helmets. When the Danes were in Britain, they had at first no other A. than leathern neck-pieces, which descended some way over the shoulders and chest; and greaves or shin-pieces for the legs. In the time of Canute or Knute, however, they adopted a kind of A. which Sir Samuel Meyrick supposes them to have borrowed from the Norsemen or Norwegians. It comprised a tunic, with a hood and long sleeves; pantaloons which covered feet as well as legs; and sugar-loaf

shaped helmets or skull-caps, with attached pieces which hid nearly the whole face except the eyes. All these were probably made of leather; but most of the surfaces were strengthened by macles or mascles, a perforated net-work of steel.

With William the Conqueror came in the kinds of A. which were at that time prevalent among the knights and soldiers of the continent of Europe, and which became afterwards more or less combined with the A. previously known in England. William himself occasionally wore a hauberk of ring-A. This kind of A. was much worn during his reign, the rings being usually attached to a foundation of leather. One curious variety of ring-A., called the haubergeon, had the tunic and breeches all in one piece. The helmets were generally conical, with a nasal or nose guard descending from the front. A distinct ring-A., called *hose*, was often worn on the legs. The shield was generally kite-shaped, unlike the oval shields carried by the Anglo-Saxons. Gradual changes in these various portions of A. were made between the reigns of William Rufus and John. In the time of Henry III. were stitched

Suit of Armor, presented by the Emperor Maximilian to Henry VIII.

and padded hauberks and chaussés, called 'ouvrages de pourpointerie'; suits of ring-A.; greaves or shin-pieces of steel; poleyns or knee-guards; vambraces or arm-guards; jacks, jaques, or jackets, made of leather, and worn over the ring-A.; interlaced ring-A., of oriental invention, not requiring to be stitched to any garment or foundation; helmets, visors, and skull-caps of various forms; and chanfrons, or A. for the head and face of horses. During Edward III.'s reign, iron plate-A. was much used by troopers, in the various forms of helmet, breast-plate, gauntlet, and greaves. In the 14th c., chain-mail fell into disuse, and was succeeded by plate-A.; this last-named kind became more and more complicated, and reached its greatest pitch of elaboration in the reign of Richard III. During the times of Henry VII. and VIII., the A. was sometimes fluted, often elaborately engraved, and even damascened or inlaid with gold. Under James I., the knightly ideas

of the feudal times gave way, and the use of A. declined; a knight armed *cap-à-pie* was a rarity. Charles I. tried in vain to revive its use; and the days of Cromwell were the last in which A. was much worn by the regular soldiers, though helmets and cuirasses are still worn by certain cavalry corps, more for show than for service.—For the chief pieces of A., see the proper titles. For other applications of the term A., see ARMOR-PLATES: DIVING-DRESS.

AR'MORER, or ARMOURER: a word whose old meaning has nearly passed away with the system to which it belonged. The armor-smiths, or makers of armor, were among the most skilful workers in metal during the feudal times; but their trade afterwards fell away. In the year 1690, the workmen-armorers of London, in a petition to parliament, complained that their trade was well-nigh ruined.

Armorers, in a somewhat different sense of the word, belong to some modern armies and navies: in some armies there are armorers to every regiment, or battalion, or brigade, not to make armor, but to repair arms.

On shipboard the A. is a first-class petty officer, who has, under the gunner, charge of all the muskets, pistols, cutlasses, boarding-pikes, etc., which he is expected to keep clean and in ready order. He is assisted by certain seamen called the 'A.'s crew'; and all are skilled in the general routine of smith's work.

ARMOR-PIERCING PROJECTILE: a steel shell designed to pierce the steel armor with which modern war vessels are protected. They are turned from the finest grade of steel, selected for two seemingly contrary purposes, toughness and brittleness. A shell must be tough enough to pierce an armor plate without splintering, and yet be blown to pieces by the explosive it carries. A projectile is a cylindrical shell with a conical head, the joint of which is capped with soft steel which acts as a lubricant when the shell strikes, aiding its passage and preventing its cracking. Every advance in the manufacture of armor plate has been met with a similar advance in armor-piercing projectiles, making it seem that any plate which may be carried by a ship can be penetrated. A Kruppized plate, eight inches thick, resisted a projectile striking it with a velocity of 2,300 feet per second, but was pierced by a capped shell 2,500 feet velocity, and a Harveyized plate has been pierced to a depth of 14 inches by a 6-inch shell.

ARMOR-PLATES.

ARMOR-PLATES: thick slabs of iron to protect the sides of ships of war and the fronts of fortifications, a recent invention. In 1812 John Stevens, of N. J. designed, an iron-clad steam battery. In 1842 Mr. Balmano, of New York, proposed that war-ships should be clad with several thicknesses of ¾-inch iron plate, riveted one on another. Robert L. Stevens, of N. J., was commissioned by the U. S. govt. to build an iron-plated war-vessel driven by screws. In 1854 the French sent several floating-batteries to the Black Sea, clad with iron plates; and the English admiralty hastily imitated this example, producing eight very slow and unmanageable batteries, 1855–6. In 1860 the French sent to sea *La Gloire*, a timber-built ship of war, altered from a 90-gun three-decker to a 40-gun corvette, clad with 4½-inch iron plates, having a burden of 3,000 tons. The Brit. govt. then began the creation of an armor-clad navy. Many problems had to be solved—whether to case old wooden ships with armor; to build and case new wooden ships; or to build new vessels, whose hull as well as armor should be of iron. Other problems were—how near the bulwarks should the armor-plates come, how near the bottom of the vessel, how near the stem and stern; also, what thickness of iron, and whether the same thickness in every part.

All the British armored men-of-war built between 1860–76 are 'iron-clads,' plated solely with iron; and in that period the thickness of the plates increased from 4½ inches to 14 inches, the weight increasing proportionately from 4–5 tons to 20–25 tons. The first 'steel-faced' plates used were on the turrets of the *Inflexible*, steel-plate of 9 inches thick forming the outside, iron-plate of 7 inches thick the back layer, a slab of strong teak being interposed 'sandwich fashion' between the two.

Since 1860, experiments have been conducted by the British and other governments to determine the conditions of the utmost practicable resisting power in ship-armor and the utmost practicable destructive power in ship artillery, experiments causing a constant enlargement of cannon and constant thickening of armor-plate. The experiments in England have been conducted principally at Shoeburyness.

In early experiments on the *Warrior* target, Alderson's steel shell, Armstrong's conical shell, and Palliser's chilled-iron shell were fired at it from a 7-inch gun at 200 yards; the Palliser shot excelled the others, going clean through the target, armor and all, and bursting behind. On another occasion, a Palliser 115-lb. shot went through the target even at an angle of 30° from the perpendicular.

The advantage contemplated in the 'sandwich fashion' of armor-plating adopted in the case of the *Inflexible* and other ships was, in addition to the increased defensive power implied in the increased thickness of plating, that broader and larger plates of practicable weight could by this means be produced, and that higher excellence of workmanship could be insured to thinner plates than to plates

of 20 inches and upwards of thickness. The Italian admiralty tested on an unprecedented scale the relatively defensive properties of iron and steel armor, in 1876, and decided on the adoption of steel armor, the *Duilio* and *Dandolo* thus being the first steel-plated ships.

The next move in armor-plating was with a view to combining the superior resistance to perforation characterizing hard steel with the superior resistance to cracking possessed by tough rolled iron; and 'steel-faced' armor—with a front-plate of steel and a back-plate of rolled iron—attained precedence of iron in English war-ships. The hard steel plate in front resists perforation better than iron, breaking up the projectiles, or rendering them unavailing, while the steel and iron plate does not crack as would steel alone. For thicknesses up to 12 inches, a steel-faced plate, it is calculated, possesses as much resistance to perforation, in case of normal impact (or straight charge), as an iron-plate from 25 to 30 per cent. thicker and heavier; and in case of oblique impact, the superiority of the steel-face over the iron plate is still greater, glancing projectiles at angles of obliquity at which mere iron would be 'bitten' into. Iron, though inferior to steel-faced plate for protection of the sides and batteries of ships, is found superior for plates 3 to 4 inches thick used for sheeting decks. A test at Spezzia 1882, indicated that a larger number of bolts were needed for a given area of steel or steel-faced plate than had been previously supposed.

Armor-clad forts are also attracting attention. Iron has been used largely in the defenses of Plymouth and Portsmouth, Eng. In 1864, a line of iron-clad forts was built up at Shoeburyness, to test several modes of construction.

Regarded as articles of manufacture, armor-plates were at first produced mainly by hammering, several thicknesses of iron being welded one upon another, at a white-heat, by blows of a ponderous steam-hammer; but it is now more customary to produce them by rolling than by hammering—pressure being considered to produce more satisfactory results than percussion.

In the U. S. navy, armor-plating had very small application till since 1883. The 'iron-clads' were mostly fourth-rate monitors with single turrets, though a few experiments with other styles of ships were made. Practically, compared with European nations, the United States had no armored vessels. Since the construction of the 'new navy' began, the United States has developed results in armor-plating surpassing those ever before achieved in the world. Until the U. S. navy dept. took up the question of armor development, but two kinds of plating were known—the all-steel product of Le Crezot in France, and the Eng. 'compound armor,' consisting of a steel face welded to a wrought-iron backing. The dept. began with experiments with an alloy of nickel instead of all-steel.

It had long been recognized that the theory upon which the English compound armor-plates were constructed

was correct, although its application in practice had failed to produce the desired result. The object was to harden the surface of the plate, but the method adopted, of welding two different materials, resulted in an imperfect union, and rendered the plate liable to destruction by the cracking or stripping off of the hard face. To obviate this difficulty a process of tempering, known as the Harvey process (from its inventor, Hayward A. Harvey, of Orange, N. J.), which had been successfully adopted in the manufacture of tool steel, was applied to armor-plates at the instance of the dept., and among those tried at Indian Head 1891 were several which had been treated in the manner described. The results confirmed the opinion already formed as to the use of nickel steel, as indicated at Annapolis, and were also extremely favorable to the new method of treatment; but it was evident that the process needed perfecting. New trial-plates, therefore, were procured from two contractors, and their first test was at Indian Head, July 20. The first plate used was a 10½-inch plate of nickel-steel made by the Bethlehem Iron Co., the plate having been forged to 12½ inches and then 'Harveyed' and finally reforged to its former dimensions. The results of this trial were in some respects remarkable, yet a lack of uniformity was shown in the surface of the plate, found on investigation to be due to the process of reforging, resulting in a lower temperature and consequently increased softness of one side of the plate.

A second plate also had been prepared of nickel-steel, in all respects identical with the first, except that it had been forged to its final thickness before the Harvey process was applied. In the trial of this plate 1892, July 30, five Holtzer 8-inch shells, 250 lbs. each, with striking velocity of 1,700 foot-seconds, and each with an energy of 5,000 foot-tons, were fired at the plate at a distance of 30 yards, making the severest test to which an armor-plate had ever been subjected. The result was extraordinary. The five projectiles were broken up on the surface of the plate. The plate itself showed no signs of injury further than an opening of a slight temper crack four inches in length from one edge, and a bulge less than one inch in thickness at the back of the plate opposite each point of impact. The points of the projectiles were splashed, as it were, on the face of the plate, filling up the indentations made by the blows with their own material, which became welded to the substance of the plate itself, leaving it practically a smooth surface. The results of this trial demonstrated that the new American armor was superior to any other in the world, and that in comparison with it the plating of the great armored fleets of Europe offered but a slight capacity for resistance to projectiles. Other naval powers took immediate notice of the revolution brought about by our navy dept. in the manufacture of armor. A test plate was at once ordered by the Brit. admiralty, and another by the Russian ministry of marine. In 1895 there was

invented at the Krupp works in Essen, Germany, a new process of hardening, and the Krupp process is now widely used. The details are kept secret, but it is probable that the essential feature is the use of chrome as well as nickel in the steel, this alloy permitting the chill to be carried deeper into the plate than when steel containing nickel only is used. The supercarbonization, though brought about by the use of a hydrocarbon gas, is the equivalent of ordinary cementation, and the usual cold spray is used to chill the surface. Kruppized plates offer some 20 per cent more resistance to ordinary armor-piercing projectiles than Harveyized plates, but when attacked by the capped projectiles now coming into general use the gain in resistance is much less. Their freedom from cracking is a further point of superiority.

When sea-going armored ships first began to be built it was possible to completely cover them with armor then impenetrable, but the increasing power of guns soon made it necessary to restrict the defended area if it was to be given complete protection. In the hopeless attempt to secure invulnerability armor was gradually stripped from other portions and concentrated over parts considered vital. The restriction of batteries to a few heavy guns, mounted in turrets or a central citadel, allowed the thickness of armor protecting men and guns to be greatly increased, with a corresponding reduction in its extent, and at the same time water-line armor was made thicker and thicker and of less and less area. Of late years, however, there has been a growing tendency to return to the early practice of expanding armor over a large area. Great as are the displacements of modern battleships it is not deemed wise to attempt to secure complete protection for any one portion of them; it is recognized that armor can only be expected to furnish a reasonable amount of security to what it covers; to keep out all small projectiles; and above all to keep out explosive shell with large bursting charges, compelling resort to armor-piercing shell. Modern battleships often carry as much as 4,000 tons weight of armor. The principle of inclining armor so as to cause it to deflect projectiles is largely used in protective decks covering the propelling machinery, and also to some extent for the defense of guns' crews. Hard-faced armor plates of as great weight as 50 tons and of as great thickness as 18 inches have been applied to ships, but in the best present practice a thickness of 12 inches is seldom exceeded. A width of about 9 feet and a length of about 18 feet are the limiting sizes of armor plates now made. Modern naval guns, firing capped projectiles, will more than overmatch the best armor plate, of thicknesses equal to their respective calibres, up to 3,000 yards' distance, provided the impact be normal to the plate's surface, but the fact that in actual battle most impacts will be at some inclination to the surface struck adds greatly to the real value of armor.

ARMOUR.

AR'MOUR, Herman Ossian, an American merchant: b. Stockbridge, N. Y., in 1837; d. 1901. After several years spent in the grain commission business in Chicago he became in 1865 the New York representative of the Milwaukee packing firm of Armour, Plankinton & Co., which retained the firm name of H. O. Armour & Co. until 1870. The name was then altered to Armour & Co., which is now one of the most important provision firms in the world.

ARMOUR, Philip D., 1832, May 16; b. Stockbridge, Madison co., N. Y.; merchant and philanthropist. He attended the Cazenovia Seminary at 14. When 19 years of age, in 1851, he walked from the State of New York to California, where in mining operations he laid the foundation of his fortune from 1852-1856. In 1856 he returned east and opened a commission business in Milwaukee, Wis. He married Miss Belle Ogden in 1862; became a member of the firm of Plankinton, Armour & Co., packers, in 1863. Later he became interested in the grain commission firm of H. O. Armour & Co., of Chicago, which firm established a pork-packing plant in that city in 1868. Mr. Armour removed to Chicago in 1875 as the head of this firm, which became the largest concern in the world engaged in pork-packing, dressed meat, and the provision business. The firm has employed more than 20,000 men, with an annual payroll of from $6,000,000 to $10,000,000 and an output estimated at $200,000,000 per year. Mr. Armour was interested in many other important business enterprises, in railroad properties and in banks. Especially interested, however, was he in the educational opportunities offered to young men of moderate means. In 1892 he founded Armour Institute of Technology, having maintained the Armour Mission, which had been founded in 1881 by his brother, Mr. Joseph Armour. Armour Institute of Technology has an endowment of over $2,500,000. Mr. Armour's beneficences were very great. He died 1901, Jan. 6. His private fortune was variously estimated at from $50,000,000 to $70,000,000. His principal heir is his son, Mr. J. Ogden Armour, who is now the head of the firm of Armour & Co., and in a very generous spirit is continuing to maintain and develop the institution founded by his father.

ARMOUR INSTITUTE OF TECHNOLOGY was founded in 1892 by Mr. Philip D. Armour, of Chicago. The aim of the Institute, as expressed in its first public announcement is as follows:

'This institution is founded for the purpose of giving to young men an opportunity to secure a liberal education. It is hoped that its benefits may reach all classes.

It is not intended for the poor or the rich, as sections of society, but for any and all who are earnestly seeking technical education. Its aim is broadly philanthropic. Profoundly realizing the importance of self-reliance as a factor in the development of character, the founder has conditioned his benefactions in such a way as to emphasize both their value and the student's self-respect. The Institute is not a free school; but its charges for instruction are in harmony with the spirit which animates alike the founder, the trustees, and the faculty; namely, the desire to help those who wish to help themselves.'

The Institute consists of the following divisions: First, the College of Engineering; second, the Department of Commercial Tests; third, Armour Scientific Academy; fourth, Department of Evening Class Instruction.

The College of Engineering at present embraces the following departments and courses of instruction: Mechanical Engineering, Electrical Engineering, Civil Engineering, Chemical Engineering, Fire Protection Engineering, and Architecture. The College offers courses of four years' duration, leading to the degree of B. S. Post graduate work, leading to the degree of M. S., is offered in all departments, and the degrees of Mechanical Engineer, Electrical Engineer, Civil Engineer, Chemical Engineer, Fire Protection Engineer are awarded to post graduate students, or students who have held responsible positions in active life for at least three years.

The Institute is an endowed institution ($2,500,000), located at Thirty-third street and Armour avenue, Chicago. The main building, an imposing structure of pressed brick and brown stone, five stories high, was erected in 1891. It contains the offices of administration, lecture rooms, recitation rooms, library, and laboratories. Machinery Hall, which was erected in 1902, is four stories in height and contains the different shops; namely, the Forge Shop, the Machine Shop, the Pattern Shop, and Foundry. Assembly Hall, formerly Armour Mission, which was founded by Mr. Joseph Armour, brother of Mr. Philip D. Armour, contains the Registrar's Office, the Civil Drafting Room, the Freehand Drawing Room, and an auditorium with a seating capacity of over one thousand. By a gift of $250,000, made in 1904 by Mr. J. Ogden Armour, to the Institute, a residence block in the immediate vicinity of the buildings of the Institute has been added for a permanent athletic field. The Institute ranks at present with the best technical colleges in the country, its aim being to take a position in the educational work of the west similar to that taken by the Massachusetts Institute of Technology in the east.

ARMS, Messenger at: see Messengers-at-Arms.

ARMS, Sergeant at: see Sergeant-at-Arms.

ARMS, Stand of: the complete set necessary for the equipment of one soldier, whether horse or foot.

ARM'STRONG (*ârm'strŏng*), Sir Alexander: an English physician: b. in Ireland about 1820; d. 1899, July 5. He was educated at Trinity College, Dublin, and at the University of Edinburgh; and became widely known as an explorer. Entering the British navy at an early age, he served in many parts of the world, took part in an expedition to Xanthus in Syria; spent five consecutive years in the Artic regions, searching for Sir John Franklin; and circumnavigated the American continent, in which voyage he became one of the discoverers of the Northwest Passage. For several years he was director-general of the medical department of the British navy. His publications include 'A Personal Narrative of the Discovery of the Northwest Passage,' and 'Observations on Naval Hygiene, Particularly in Connection with Polar Service.'

ARMSTRONG, David Maitland: an American genre and decorative artist: b. near Newburg, N. Y., 1837, June 12. He was graduated from Trinity College, Hartford, Conn., in 1858; practised law a few years, and then studied art in Paris and Rome. He was United States consul-general for Italy for four years, and director of the American Art Department at the Paris Exposition in 1878, receiving the Legion of Honor decoration for his services. For many years he was at the head of a decorative glass establishment in New York city.

ARMSTRONG, George: called the 'Father of the United States Railway Mail Service:' b. Armagh, Ireland, 1822, Oct. 27, d. Chicago 1871, May 5. His parents came to the United States when he was eight years old and settled in Baltimore. He entered the postal service in Washington when a young man, and his ability won him promotion in 1854 to assistant postmaster at Chicago. He then made a study of mail transportation, wrote exhaustively on the subject, and in 1864, July, was given authority by Postmaster-General Montgomery Blair to experiment on any railroad he might select. The first trial took place on the Northwestern Railroad 1864, Aug. 28, between Chicago and Clinton, Iowa, and was a complete success. He was the head of the service from the start but was assigned to headquarters in the West, with general supervision of the service in the East. In 1869 President Grant directed that a bureau be made of the railway postal service, and placed Armstrong at the head as general superintendent, a position which he held until his death two years later. A bronze statue in memory of his work was erected in the post-office building, Chicago, in 1881, May.

ARMSTRONG, John: 1709–1779, Sep. 7; b. Castletown, a pastoral parish in Roxburghshire, of which his father was minister. He studied medicine at the Univ. of Edinburgh, and soon afterwards commenced practice in London,

and became known by the publication of several fugitive pieces and medical essays. In 1737, he published a very objectionable poem, *The Economy of Love*, which injured his reputation for a time. His principal work, *The Art of Preserving Health*, a didactic poem in blank verse, extending through four books, appeared in 1744. In 1760, he was appointed physician to the forces in Germany. Returning to London, he resumed practice, and died there. He was the author of several vols. in verse and in prose.

ARMSTRONG, John, an American soldier: b. Ireland, 1725; d. Carlisle, Pa., 1795. He led a successful expedition in 1756 against the Indians at Kittanning, Pa.; became a brig.-gen. 1776, March, but resigned 1777, April. He commanded the Pennsylvania militia at the battle of the Brandywine, 1777, Oct. 4, becoming a major-general in 1778. He sat in the Continental Congress, 1778–80 and 1787–88.

ARMSTRONG, John: 1758–1843 (or 55); b. Carlisle, Penn.: American soldier and author. He served in the Revolutionary war, and at its close wrote the *Newburgh Letters*, taking up the cause of the officers who were suffering for their pay. These letters were published anonymously, and caused much excitement. Washington took the matter in hand, wisely averted the dangers of the movement, and did what he could to redress the wrongs of the soldiers. See Irving's *Life of Washington*. He was a brigadier-gen. in the war of 1812. He held several important civil offices, and was secretary of war, 1813–14. Being held responsible or the capture of Washington by the British, he resigned, 1814, Sept. He published several historical works relating to the wars in which he had served.

ARMSTRONG, John: 1784, May 8—1829, Dec. 12; b. Ayres Quay near Bishop-Wearmouth: eminent physician and medical writer. He studied medicine at the Univ. of Edinburgh, commenced practice at Bishop-Wearmouth, and in 1818 he removed to London, where his practice became extensive, and he was elected physician to the fever hospital. His works on medical science were numerous, and of much value, especially regarding typhus fever, and febrile diseases generally. His lectures to his medical classes were published after his death, with the title, *Lectures on the Morbid Anatomy, Nature, and Treatment of Acute and Chronic Diseases, by the late John Armstrong, M.D. Edited by Joseph Rix*—one of his pupils. (London, 1834, 8vo.)

ARMSTRONG, Samuel Chapman, ll.d.: military officer, and educator: 1839, Jan. 30—1893, May 11; b. Wailuka, Main, Hawaii; son of Richard A., d.d. (1805–60, b. Penn. of Scotch-Irish descent). Gen. A.'s mother was b. in Mass., of Puritan stock. His parents went 1831 as missionaries, of the Amer. Board, to the Sandwich Islands. He came to this country 1860, to complete his education, and graduated at Williams Coll., Mass., 1862.

In that year, he organized a company of vols. and entered the Union army as capt. Three months' imprisonment followed his capture at Harper's Ferry. His gallantry at Gettysburg won his promotion as major 125th N. Y. Vols. He was promoted lieut.-col. 9th U. S. colored inf. 1863; col. 8th U. S. colored inf.; and brevetted brig.gen. vols. 1865. 1866, Mar., he was placed by Gen. O. O. Howard in charge of 10 counties in e. Va. with headquarters at Hampton, then a great contrband camp. In this district there was much irritation between the swarms of colored refugees and Gen. Lee's disbanded soldiers and the former residents; but order and peace were secured by the firm and kindly rule of Gen. A. At this time, according to his suggestion and plan, was established the Hampton Normal and Agricultural Institute (q.v.). Unexpectedly to himself Gen. A. was offered the chief directon of this work, to which he devoted his life with unflagging ardor and self sacrifice. Gen. A. has annually raised by his own efforts at the north $60,000 to carry on this great work. In 1891, in Boston, while making a plea for Hampton he was stricken with paralysis, from which he never entirely recovered. He died at the scene of his labors.

ARMSTRONG, Lord (William George Armstrong), LL.D., D.C.L.: noted for his inventions, especially in artillery and in water-power machinery: b. 1810, Newcastle, where his father was a merchant. A. was articled to a solicitor in Newcastle and became his partner, but gave his leisure to his favorite pursuits in chemistry and mechanics, and his inventive faculty was constantly active. About 1838 he invented a much improved hydraulic engine; in 1845 a hydraulic crane; in 1842, an apparatus for producing electricity from steam, in reality from the friction sustained by the small quantity of water which accompanies the steam in its discharge. These and other inventions brought him into notice; he was elected a member of the Royal Soc. 1846; and shortly afterward, in conjunction with some friends, commenced the Elswick engine works, in the suburbs of his native town, an establishment on a large scale for producing mechanical constructions.

In 1854, while war was raging in the Crimea, the War-office was solicited by many inventors to make trial of new forms of cannon and projectiles. Mr. A., one of the number, was employed to make explosive apparatus for blowing up the ships sunk at Sebastopol. This led him soon afterwards to consider improvements in ordnance, and he devised a form of breech-loading cannon, combining many peculiarities in structure and action. He received encouragement to make a few field-pieces on his new method. He made lengthened experiments on the strength of iron and steel, on the relative merits of cast and wrought iron, on the best number of grooves in rifling, on the best pitch or twist for these grooves, on the most convenient modes of loading at the breech of the gun, on the mechanism for lessening the recoil, on the best form and structure of shot and shells, and on the fuses best suited for igniting the shells during their flight

ARMSTRONG.

Most of the early experiments were with guns throwing 6-lb. and 18-lb. shot and shells, and subsequently 32-lb. shells. The last-named gun was built up piecemeal, to avoid flaws or faults, and to insure strength, lightness, and durability. It was made in 3-ft. lengths. Bars of wrought-iron, 2 inches wide, were heated to whiteness, twisted spirally round a steel bar or core, and welded; other bars were twisted over these in a similar way, but with an opposite turn of the spiral; a third, and perhaps a fourth were added, according to the thickness and strength needed. Another heating to whiteness preceded a thorough welding of all the layers of bars by a steam hammer. The ends of two of these 3-ft. pieces were then nicely trimmed and adjusted, placed in contact, and bound together by the enormous pressure of a wrought-iron ring shrunk on while at a white heat. By varying the number and length of these sections, a gun of any length could be made. The core was then removed, and the bore of the gun rifled by exquisite machinery. The rifle-grooves were so small and close as to be upwards of 40 in number; their pitch or twist such as to make a complete circuit in a gun 10 ft. long. The breech of the gun was wholly distinct, and constructed in a different way; it could be drawn backward by unscrewing, and had a hole through its centre for introducing the shot or shell and the charge. At first the inventor adopted a steel interior for his gun; but afterwards relied on the toughest wrought-iron. The projectile employed with this gun might be solid shot, shell, case-shot, or canister-shot; but the shell was that to which most interest is attached. It was about three diameters in length; and thus a 32-lb. shot or shell could be fired from a gun of much smaller calibre than if it were spherical. The shell was built up of about 50 separate pieces of cast-iron, very accurately fitted, and enveloped in an iron sheath. Outside of it were two bands of lead, soft enough to be forced into the rifled grooves of the gun, and thus to acquire the rotatory movement by which the straightness of flight is so much insured.

The actual results obtained by a gun such as is above described were almost incredible. An ordinary long 32-pounder weighs 57 cwt.; Armstrong's 32-pounder weighs 26 cwt. The former requires 10 lb. of powder as a charge; for the latter 5 lb. will suffice. The former will send a shot or shell 3,000 yards; the range of the latter exceeds 9,000 yards. The fuses attached to the shells are so exquisitely adjusted that the shell can be made to burst either directly on leaving the gun, or half-way on its path, or when it strikes an object; in the last-named case, even a sack of shavings will afford the necessary concussion; and yet, so close is the structure, that an uncharged shell has been fired completely through 9 ft. of solid oak without the pieces separating. A.'s elaborate experiments were made chiefly with a 6-pounder, $1\frac{3}{4}$-inch calibre, and so light that two men could carry it (without its carriage); this small gun could reach 1,500 yards with wonderful ac

curacy of aim, and had a range of 3,000 yards at a certain elevation.

When A. had spent much of his time and thoughts during four years on this subject, the government, supported by the strongly expressed opinions of artillery officers of all ranks, proposed to secure the result of these experiments for the nation. A. offered to the government, without any stipulation, not only all his past inventions, but also all such as he might hereafter discover. This led to arrangements which the ministers in parliament characterized as liberal and patriotic on his part; and the terms thus suggested were accepted. An office was created for him, that of chief-engineer of rifled ordnance, for seven years provisionally; and a certain amount of salary was determined on, in consideration at once of his past inventions and of his future services.

The peculiar connection, partaking in some degree of the nature of a partnership, between the government and the Elswick firm, underwent changes from time to time, and was brought to a close in 1863. During its continuance, guns of gradually increasing power were made on A.'s system; 3, 5, and 12 pounders; then 18, 20, 32, and 40 pounders; then rapidly increasing in calibre, until at length a 600-pounder was produced, weighing upwards of 20 tons. The coil system of construction, the adoption of a large number of rifle grooves, and the use of the beautifully formed segment shell, were continued; but A. made variations in the combination of steel and iron, and adopted muzzle-loading for many of his larger guns. A. long supplied many foreign governments with his guns, chiefly of large calibre. The manufacture is of the highest order, effected through the medium of machine tools of exquisite construction; but the practical utility of the gun, as compared with the Whitworth, Palliser, and other kinds, is still matter of controversy. See MACHINE GUN.

The great reputation and commercial success of A. depend on his skill as a constructor of water-power machinery. Early in his career, in 1847, when a plan was adopted for supplying Newcastle with water, he suggested that the power derived from the descent of the water through pipes from the reservoir should be utilized for working hydraulic cranes on the quay, and for various mechanical purposes in the town; this was done with marked success. The system has rapidly grown; until, at length, the A. hydraulic machinery is largely adopted in England and other countries for raising, lowering, hauling, and other purposes in connection with railways, canals, docks, piers, harbors, lock-gates, manufactories, warehouses, etc. The fabrication of the machinery employs a very large number of hands at Elswick, where the works are carried on by a joint-stock company. A. belonged to several scientific societies, and in 1863 was president of the British Assoc. Cambridge and Oxford conferred honorary degrees on A., and he was a member of several foreign knightly orders. He was knighted by the queen 1858; and created Baron A. 1883. D. 1900, Dec. 27.

ARMY: a body of men, organized and armed for war. The following are distinctions in the application of the name A. A *Covering A.* is encamped or in cantonments, for the protection of the different passes or roads which lead to the town or other place to be protected. A *Siege A.* is ranged around or in front of a fortified place, to capture it by a regular process of besieging. A *Blockading A.*, either independent of or auxiliary to a siege A., is intended to prevent all ingress and egress at the streets or gates of a besieged place. An *A. of Observation* takes up an advanced position, and by celerity of movement keeps a close watch on all the maneuvers of the enemy. An *A. of Reconnaissance* has a more special duty at a particular time and place, to ascertain the strength and position of the enemy's forces. A *Flying A.* comprises a strong body of horse and foot, moving quickly, to alarm the enemy, and to protect garrisons.

For historical notices or for descriptions of national military forces, see ARMIES: BRITISH ARMY: UNITED STATES ARMY. For the formation, organization, discipline, arms, equipment, duties, and tactics of armies, see the proper titles.

ARMY ADMINISTRATION: the whole of the operations connected with the raising, clothing, paying, maintaining, and controlling of an army. They are distinct matters from military command and discipline. The supreme command of the British army is assigned to the sovereign; but the secretary of state for war is his responsible representative in all that concerns administration—the commander-in-chief being his representative in matters relating to military command and discipline. In the United States, the president is commander-in-chief of all the military forces of the nation; the secretary of war, appointed by the president, has the charge of military administration under the president's direction.

ARMY CORPS, a term denoting one of the largest divisions of an army in the field, comprising all arms, and commanded by a general officer; but subdivided into divisions, which may or may not comprise all arms.

ARMY HOSPITAL TRAIN, a railway contrivance for military purposes, introduced by the surgeon-general of the United States army during the war with Spain, in 1898, for the purpose of conveying sick and wounded soldiers, on their arrival from Cuba, at Florida ports, to various military hospitals in the United States. This train had a full staff of physicians, surgeons, and trained nurses, and was completely equipped with everything necessary for medical and surgical treatment of soldiers.

ARMY REGISTER: an annual publication under authority of the U. S. govt., giving the official list of the U. S. Army. It shows the regiments, companies, etc.; the officers; with the deaths and promotions during the year previous. A similar publication in Great Britain is called the Army List.

ARMY SCHOOLS: arrangement for instruction under govt. auspices, in connection with the U. S. army. They comprise two plans; one for education of enlisted men, the other for the children of enlisted men for whom it is compulsory, and for those of officers, for whom it is optional. The schools for soldiers are termed post-schools, and are conducted by officers of recognized ability, detailed for the purpose, and whose duty it is, to instruct enlisted men, and who are assisted by competent persons detailed from the rank and file. Where a post has a chaplain he is also the instructor. Officers from the inspector-general's dept. inspect schools at stated periods, and exercise authority in regard to the systems of education and methods employed. Children's schools are established at posts where the number of soldiers' children warrants it, and where no other means for instruction exist; and in such cases the children of private citizens living in the neighborhood of army posts are permitted, on payment of a small stipulated sum, to partake of the advantages.

ARMY-WORM (*Leucania unipuncta*): a gray caterpillar, striped with dark and yellow lines, allied to the cut-worm (q. v.), sometimes very destructive to cereal and forage crops. Though found at the s., it is more common in the n. and central states. The moth is brown, with white dot on the fore-wing. Its eggs are laid, from Apr. to June according to latitude, on grass plants, between the sheath and blade, and hatch in 7 to 10 days. The larva eats voraciously till it reaches its full size, nearly 2 in. in length, in about four weeks. It then forms a cell in the ground, changes to the pupa state, and in 14 to 21 days emerges as a moth. In the n. there are sometimes 2 broods, and at the s. 3 are common in a single season. Many of the moths, and a still larger number of the larvæ, live through the winter. In regions where it finds its home, this insect is usually present in grass-fields, but seldom attracts much attention. Occasionally there is a season in which its numbers are greatly increased, and it causes farmers immense loss. When compelled to migrate for food the caterpillars march in a solid body like an army, take a straight course, and consume every green thing in their path. In about 2 weeks from the beginning of their march they enter the ground to be transformed into moths. Their appearance cannot be confidently predicted, but is most likely after a mild winter preceded by a dry summer. Myriads of these insects are destroyed by contagious diseases; also birds and other insects are very destructive. Their vast numbers make it difficult to check their migrations; but the plowing of deep furrows with the steep sides away from the worms, placing boards on edge to form a fence, and poisoning with Paris green the grass or grain in their path, have been tried with varying success.

ARNAULD, *ârnō'*, ANGELIQUE: 1624, Nov. 28—1684,

Jan. 29; dau. of Robert Arnauld d'Andilly. From her earliest years, she showed extraordinary force and resoluteness of character. When not quite twenty years of age, she became a nun at Port-Royal des Champs, where she had been educated by her aunt, Marie Jaqueline Angélique Arnauld, sister of the great Arnauld. Nine years afterwards she was made sub-prioress; and, removing some years later to Port-Royal de Paris, she held the same office. During the persecution of the Port-Royalists, A. A., by her piety and courage, sustained the spirit of the sisterhood. The whole family, male and female, were determined Jansenists, and none more so than Mother Angélique de Saint-Jean (her conventual name), who met her many misfortunes with earnest intrepidity. A royal order was issued to break up the nunnery. The police arrested the inmates, who were dispersed in various convents throughout France, and constant efforts were made by the Jesuits to induce them to sign the 'Formulary of Alexander VII.' A. A. was alone exempted from listening to their arguments and solicitations, her 'obstinacy' being supposed invincible. At length, by command of the Abp. of Paris, the nuns were restored to Port-Royal des Champs; but for some years they were subjected to a strict surveillance by soldiers, who watched all their movements, and allowed them no intercourse with persons out of the convent. In 1669, however, was issued the edict of Clement IX. for the peace of the church, which was a kind of compromise on the vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped, and constituted their society anew. A. A. was again elected prioress. In 1678, she was made abbess. After the death of her protectress, the Duchesse de Longueville, 1679, the persecution recommenced. At last Angélique sank under a complication of griefs, and died. She was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. A. A. wrote several works, the most valuable of which is *Mémoires pour servir à la Vie de Mère Marie Angélique Arnauld de Sainte Madeleine, Réformatrice de Port-Royal.*

ARNAULD, Antoine: 1560–1619, Dec. 29; b. Paris: the greatest advocate of his time in France. He was descended from an ancient family in Auvergne, which had distinguished itself in both civil and military affairs. A. was not less remarkable for his eloquence than for his probity. His zealous defense of the Univ. of Paris against the Jesuits in 1594 won for him a wide celebrity. It was reprinted in 1717. He published another work against the Society of Jesus and several tractates of an earnest political character. The Jesuits accused him of being a Huguenot, but the accusation was unfounded, for he had no personal predilection in favor of Protestantism as a distinct religious system. He had several children, who formed the nucleus of the Jansenists and Port-Royalists.

ARNAULD, Antoine, known as the great A.': 1612, Feb. 6—1694, Aug. 8; b. Paris: twentieth and youngest son of Antoine (1560–1619). Although originally intended for the bar, he disliked the legal profession, and entered the service of the church. At the Sorbonne, he became a pupil of Lescot, the confessor of Cardinal Richelieu, and afterwards bishop of Chartres. Lescot initiated him into the scholastic theology; but his attention and admiration were drawn to the writings of Augustine, who, he himself admitted, first showed him the difference between the two states—that of a nature whole and sound, and that of a nature corrupted by sin. In 1641, the Sorbonne wished to receive him into their society, on account of his extraordinary piety and talents, but Cardinal Richelieu opposed this. In the following year he was ordained a priest, and in 1643 he published a work entitled *De la Fréquente Communion*, which was received in the most favorable manner by all except the Jesuits who had taken alarm at the virtues of A., and were already attempting to defame one whom they instinctively felt to be a reproach to their order. As a consequence of this publication, he was now admitted 'of the Society' of the Sorbonne. A. not only replied to the aspersions of the Jesuits in his *Avertissement*, but also sent forth a work which was the prelude to a long and fierce contest with his adversaries, *Théologie Morale des Jésuites* (Moral Theology of the Jesuits). But the hatred of the latter was not confined to literary libels; they advised the chancellor of the Sorbonne to carry the dispute to Rome, whither A. would be obliged to follow and defend himself. In this scheme, however, they were defeated.

A. now buried himself in seclusion for twenty-one years, during which period his pen was almost continuously active. In 1644, appeared his *Tradition de l'Eglise sur la Pénitence* (Opinion of the Church on the Doctrine of Penitence). It was a reply to the attacks which the Jesuits had made against his *Frequent Communion*. A. was still entangled in the disputes which arose out of this treatise, when he became involved in another controversy that colored the whole of his subsequent career, and may be said to have won for him his position in history. This was the great Jansenist controversy. In 1640, had appeared a posthumous work of Jansenius, bishop of Ypres, entitled *Augustinus; seu Doctrina Sancti Augustini de Humanæ Naturæ Sanctitate, Ægritudine, Medicinâ, adversus Pelagianos et Massilienses*. It laid down with a rigor equal to that of Calvin the doctrines of predestination, the corruption of human nature, and the depravity of the will. It was specially intended as a counteractive against the lax principles and loose morality of the Jesuits, many of whom, and especially their great champion, Molina, entertained extreme Pelagian views of the freedom of the human will, which they had cunningly interwoven into their 'scarlet-colored' web of ethics. The work, in the meantime, was condemned by Pope Urban VIII., 1641, Aug. 1. A., who quickly apprehended its vital importance in the existing

state of things, boldly ventured to defend it against the censures of the papal bull. He published several pamphlets, closing with a first and second *Apologie de Jansénius.* It is to the honor of the religion of A., however, that it was not always controversial. Whenever a moment of armistice was permitted him, he occupied it in writing such works as *Mœurs de l'Eglise Catholique, La Correction, La Grâce, La Vérité de la Religion, De la Foi, de l'Espérance, et de la Charité,* and the *Manuel de Saint Augustine.* He also varied these occupations by translating into Latin his *Frequent Communion,* and by the composition of his *Novæ Objectiones contra Renat. Descartis Meditationes,* and several smaller tractates. In addition to his literary labors, he undertook the direction of the nuns of Port-Royal des Champs, a convent of which his sister, Marie Jaqueline Angélique Arnauld, was abbess. In this retreat he was surrounded by many friends, thirsting like himself for the quiet pleasures of study, some of whom have left their mark in the world, such as Pascal, Nicole, etc. Here they wrote in common numerous excellent works. A. executed parts of the *Grammaire Générale Raisonnée de Géométrie,* and *L'Art de Penser.* In 1649, the Jansenist controversy broke out more fiercely than ever. The *Augustinus* of the Bishop of Ypres was again attacked and condemned by the Sorbonne and the pope. A. replied in his *Considérations.* In 1650, appeared what he conceived to be his best work, *L'Apologie pour les Saints Pères.* For the next half-dozen years he was engaged in constant and painful disputes, yet, in spite of the polemical character of his life, the impression of his piety and earnestness was deepened in the mind of the nation; and on reading some of his compositions, even Alexander VII. is reported to have praised the author, and to have exhorted him for the future to despise the libels of his adversaries. During the strife he published *La Concorde des Evangiles* and *L'Office du Saint-Sacrement.* In 1655–56, for prudential reasons, he left his retreat at Port-Royal; about the same time he was expelled from the Sorbonne and the faculty of theology.

In 1656, the war with the Jesuits was renewed—not, however, by A. in person. An unknown knight with closed visor had ridden into the lists—the great Pascal. Under the *nom de plume* of Louis de Montalto, he discharged his scorpion wit against the Jesuits for about a year and a half in the *Provincial Letters.* A. furnished him with materials; but, in 1658, he took the field *in propriâ personâ* by publishing his *Cinq Écrits en faveur des Curés de Paris contre les Casuistes relâchés.* In 1662, appeared *La Nouvelle Hérésie* (of the Jesuits); in 1669, the first vol. of his *Morale Pratique* (of the Jesuits), the last of which was not published until the year of his death.

A., who was a sincere Catholic after his fashion, next had a theological controversy, properly so-called, with the reformed minister Claude, the consequence of which was his vol., *Du Renversement de la Morale de J. C. par la Doctrine des Calvinistes touchant la Justification* (1672). In 1675, he returned to the subject in his *Impiété de la Morale des*

Calvinistes. Some years previous to this, A. had enjoyed the peace of Clement IX., which put a stop for the time to the Jansenist controversy. He had been presented to the papal nuncio and to the *Grand Monarque,* both of whom flattered him highly; but the Jesuits, who could not breathe freely in his presence, used their utmost efforts to prejudice Louis against him, and at last the king issued an order for his arrest. A. hid himself for some time, but finally withdrew into Belgium. He felt his exile keenly, though honored by many persons of learning and dignity; and could not rest in one city, but wandered from place to place, ever showing the same astonishing vigor of mind and the same polemical tendency. It is strange that this man, who was celebrated among his friends for equanimity and gentleness of heart, should have been so bitter in his controversies, even with his friends, for he wrote not against his enemies only, but against Pascal, Domat, Nicole, his protector, Pope Innocent XI., and his old friend, Père Malebranche. So earnest was he for the truth—which earnestness had no doubt been greatly intensified by persecution and controversy—that he could never thoroughly recognize that there might be truth on the other side also. He died at Brussels. His works, which amount to upwards of 100 vols., were pub. Paris, 1775–83.

ARNAULD, Robert d'Andilly: 1588–1674, Sept. 27; eldest son of Antoine Arnauld, the advocate; brother of the great Arnauld. He was a person of considerable consequence at the French court, where his influence was ever exerted beneficially. Balzac spoke very highly of him. At the age of fifty-five, he quitted the bustle of the world for the solitude of Port-Royal des Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions of St. Augustine* and of the *History of the Jews,* by Josephus. The latter work is esteemed more elegant than accurate, however. In 1668, appeared his translation of the *Lives of the Holy Fathers of the Desert, and of several Saints;* and in 1670, that of the works of St. Theresa. He was likewise the author of some pieces of religious verse.

ARNAUTS, n. plu. *âr'nawts,* a native name for the Albanian mountaineers, and meaning 'brave men.'

ARND, or Arndt, *ârnt,* Johann: 1555–1621; b. at Ballenstadt, Anhalt; was Lutheran pastor at Quedlinburg, Brunswick, and elsewhere, and died at Celle, Hanover. He was remarkable for his piety and active benevolence; but he is known chiefly for a work entitled *True Christianity* (*Wahres Christenthum*), which was translated into most European languages, and is yet popular in Germany. Its object is 'edification'—the promotion of practical religion; and it is written with great warmth and unction, and in a strain of piety bordering on mysticism. It has been called the Protestant à Kempis, and its author the Fenelon of the Protestant Church. There is an English translation by W. Jaques (Lond. 1815, 2 vols.).

ARNDT. Ernst Moritz: 1769–1860, Jan. 29; b. in the

island of Rügen: prof. in the Univ. of Bonn, and for half a century one of the leading political writers of Germany. After travelling over great part of Europe, he became, in 1806, prof. of history in Greifswald. Here, among other writings, he published his *History of Serfdom in Pomerania*, for which he was formally denounced and accused by several nobles. In his *Spirit of the Times* (Altenb. 1807), he attacked Napoleon with such boldness that, after the battle of Jena, he had to take refuge in Stockholm. Returning under a feigned name, he resumed his functions at Greifswald in 1810; but war becoming imminent, he resigned the following year, and became an active co-operator with the minister, Von Stein, and other patriots, in throwing off the foreign yoke. His numerous fugitive writings, full of energy and fire, contributed not a little to rouse and sustain the spirit of Germany for the war of liberation. His best poems belong to this period, and several of them have become national songs. (A new selection, Leip 1850.) His song, *What is the German's Fatherland?* is sung wherever German is spoken. In 1818, he was made prof. of modern history in the new Univ. of Bonn, but became involved in 1819 in the prosecutions for what were called 'demagogic movements,' and was suspended. Though acquitted on trial, he was made to retire, retaining his salary. After twenty years' suspension, he was restored in 1840. His writings are numerous: we may mention his *Beschreibung und Geschichte der Schottländ, Inseln*, etc. (Leip. 1826): a collection of his fugitive *Schriften für und an meine lieben Deutschen* (3 vols. Leip. 1845); and *Erinnerungen aus dem aüssern Leben* (3d ed. Leip. 1842). He was elected a member of the German national assembly in 1848, but seceded from it with the whole Gagern (q.v.) party in 1849. He powerfully supported the party who advocated a constitutional hereditary monarchy, and took a prominent part in the appointment of the archduke John as regent, and in the fruitless deputation to Berlin to offer the empire to the king of Prussia. After the dissolution of the Frankfort assembly, A. did not cease in his fugitive writings to advocate the views of the German national party.

ARNE, *ârn*, Thomas Augustine, Mus. Doc.: 1710–78; b. London: one of the best and most genial of English composers. He received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar; but the love of music was too strong to be restrained. Young A. became skilful as a violin-player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterwards celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond*, which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterwards his *Comus* (1738), showing greater cultivation of style. He married a singer, Cecilia Young (1840); and after a successful visit to Ireland, was engaged as composer to Drury Lane Theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air,

Rule Britannia, which was originally given in a popular performance, *The Masque of Alfred,* was his composition. He composed also two oratorios, the opera *Eliza,* and another, *Artaxerxes,* in the Italian style; but his genius was better adapted to simple pastoral melody than to great dramatic compositions. He died in London.

ARNEB, n. *ar'nĕb:* fixed star of 3½ magnitude, called also *α* Leporis.

ARNEE, n. *ăr-nē',* or ARNA [native name]: the largest animal of the ox kind yet known. It is a native of India,

Skull and Horns of Arnee.

and is found chiefly in the forests at the base of the Himalayas and in the n. e. provinces, never descending to the low plains. It is simply the wild buffalo, and differs from the tame variety in being larger and fiercer. Alone of Indian wild animals, it will charge unprovoked. The

Arnee.
(From an Indian picture.)

A. is technically termed *Bubalus Arni.* The color is slaty black; the hide very thick, with scanty hairs. A pair of horns in the British Museum measure more than six feet each along the outer curve. When the head of an A. is placed with the muzzle on the ground, it requires the outstretched arms of a man to hold the points of the horns.

From the manner in which the A. is introduced in Indian paintings, it seems to have been sometimes tamed.

ARNHEIM, *ârn'hīm*, or ARNHEM, the Roman *Arenacum*: cap. of the prov of Guelderland, Holland; on the right bank of the Rhine, which is here crossed by a bridge of boats; has a considerable transit-trade between Amsterdam and Germany. The environs of this strongly fortified town are exceedingly picturesque. Among its most remarkable buildings are the Reformed Dutch Church, which contains monuments of the dukes of Guelderland; and the town-house, noted for the grotesque adornment of its front, which has gained it the name of Duivelshuis. There are several paper-mills in the neighborhood. Here Sir Philip Sidney died in 1586, after the battle of Zutphen. In 1813, A. was taken by storm by the Prussians, under General Bulow, and the way thus prepared for the occupation of Holland. Pop. (1891) 50,194; (1901), 58,168.

ARNHEM LAND, *ârn'hĕm-*: name formerly applied to a region in North Australia; so called from the ship of the Dutch navigators who discovered it, 1618.

ARNICA, n. *ârˈnĭ-kă* [Gr. *arnĭon*, a little lamb—from *arna*, a lamb—from the resemblance of the leaf to the soft coat of a lamb]: genus of plants belonging to the natural order *Compositæ*, the tribe *Senecionideæ* The flowers of the ray are female and ligulate, those of the disk hermaphrodite and tubular. The receptacle is naked; the pappus hairy. The root, leaves, and flowers of the Mountain A. (*A. montana*), sometimes called Mountain Tobacco, and Leopard's Bane, are much valued in medicine, and administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. They are also applied with much benefit to bruises, to promote the re-absorption of extravasated blood. They contain a peculiar volatile oil, a resin, an extractive matter, and an alkaloid (*Arnicina*). The root is perennial and crooked, the stem about two ft. high, simple or little branched, with few leaves, bearing on the summit a head of flowers of a dark golden yellow, often two inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is

Arnica montana.

found as far s. as Portugal, and as far n. as Lapland. *A. mollis*, n., and *A. nudicaulis*, s., are N. American.

ARNICINE, n. *ârʹnĭ-sēn* [see ARNICA]: a bitter principle contained in the flowers of the *Arnica montana*.

ARNIM, *ârʹnĭm*, ELIZABETH VON, better known as Bettina, wife of Ludwig Achim von Arnim (q.v.): 1785–1859; b. at Frankfort-on-the-Maine. From her childhood excitable and eccentric, an early and profound impression was made upon her mind by the suicide of her friend, the Canoness von Gunderode. The next great event of her life was her devoted attachment to and intimacy with Goethe, at that time a man of nearly sixty. Their correspondence, entitled *Goethe's Letters to a Child*, was published in 1835, and translated by Bettina into English. Her letters are poetical, graceful, and fascinating, though often careless and extravagant, and abound in graphic sketches of men of the time. Goethe turned many of these letters into verse. Bettina's later works were semi-political in their character, and, like her earlier, full of fantastic beauty.

ARNIM, KARL OTTO LUDWIG VON: 1779–1861; b. Berlin: well-known writer of travels and other works. After studying at Halle and Göttingen, he travelled at different times over the most of Europe, and was employed on the embassies at Stockholm and London. His *Flüchtige Bemerkungen eines flüchtigen Reisenden* (Passing Remarks by a Passing Traveller, 6 vols., Berl. 1837–50), is recommended for its clear, elegant style, as contrasted with the lumbering and involved writing of the 'Academic' school. A. also wrote in English *Napoleon's Conduct towards Prussia* (Lond. 1814), and published *German National Melodies*, with German and English text (Lond. 1816). He was the author of a play and several poems.

ARNIM, LUDWIG ACHIM VON: 1781, Jan. 26—1831, Jan. 21; b. Berlin: fantastic but original German writer of romances. After studying the physical sciences, he began his career as an imaginative author with *Ariel's Revelations*, a romance which, though based on the principles of the new poetic school which had then risen in Germany, indicated, nevertheless, that the author could strike out a way of his own. His travels through Germany afforded him an opportunity of catching the peculiarities of popular life in its various provincial manifestations. He was especially interested in the old popular poetry, and stirred up among his countrymen a warmer sympathy for it by the publication, with Clemens Brentano, of *The Boy's Wonderhorn* (Heidelberg, 1806–08). In 1809, appeared the *Winter Garden*, a collection of novels; in 1810, the romance entitled *The Poverty, Riches, Guilt, and Repentance of the Countess Dolores;* in 1811, *Halle and Jerusalem, the Sports of a Student, and the Adventures of a Pilgrim*, in which last his humor took a very saucy turn. In 1817, he published the *Crown Guardians*, a work characterized by its originality, richness of fancy, and vivid portraitures. The later years of his life were spent partly in Berlin and partly at his estate near Dahme, where he died.

AR'NO: next to the Tiber the most considerable river of

central Italy; rises on Mount Falterona, an offset of the Apennines, 4,444 ft. above the sea, 25 m. n. of Arezzo. It flows s.e. through the deep and fertile valley of Casentino; enters the richly cultivated plain of Arezzo, where it receives the waters of the Chiana; then flows n.w. and n. through the upper valley of the A. (*Valdarno*), one of the most delicious parts of Tuscany; afterward it receives the Sieve, its largest tributary, and turns its course toward the w., flowing past Florence, Empoli, and through the town of Pisa. Total length about 140 m. In old times, the embouchure of the A. was at Pisa; now it is about four or five m. distant. lat. 43° 41′ n., long. 10° 15′ e. The A. is navigable for barges as far up as Florence, but in the summer this frequently becomes impossible. The Italian poets speak of 'the golden A.,' but, in truth, its waters have mostly the unpleasant color of milk and coffee mixed. The A. is noted for rapid and destructive inundations. The most memorable are those of 1537, Sep., when the whole of the Valdarno was laid under water, which rose to the height of 8 ft. in parts of Florence; and that of 1740, caused by the long continuance of the sirocco, which completely melted the snows on the Apennines.

ARNOLD, *ăr'nŭld*, or ARNALDO, *ăr-nâl'do*, OF BRESCIA: born Brescia; d. 1155: reformer, who attacked the corruption of the clergy of his day. He was educated in France under Abelard, and adopted the monastic life. By his preaching, the people of his native place were exasperated against their bishop, and the fermentation and insurrectionary spirit spread over a great part of the country, when he was cited before the second Lateran Council, and banished from Italy. He retired to France, but experienced the bitter hostility of St. Bernard, who denounced him as a violent enemy to the church. He thereupon took refuge in Zurich, where he lived several years. Meanwhile his doctrines exerted powerful influence in Rome, which ended in a general insurrection against the govt., whereupon A. repaired thither, and endeavored to lead and direct the movement. He exhorted the people to organize a govt. similar to the ancient Roman republic, with its consuls, tribunes, and equestrian order. But they, provoked by the treachery and opposition of the papal party, and disunited among themselves, gave way to the grossest excesses. The city was for ten years in great disorder. Lucius II. was killed by the populace in an insurrection 1145; and Eugenius III., to escape a similar fate, fled into France. These violent struggles were subdued by Pope Hadrian IV., who, feeling the weakness of his temporal authority, turned to the spiritual, and resorted to the extreme measure of laying the city under excommunication; when A., whose party became discouraged, and fell to pieces, took refuge with friends in Campania. On the arrival of the emperor, Frederick I., for his coronation 1155, A. was arrested, brought to Rome, tried, hanged, his body burned, and the ashes thrown into the Tiber.—His followers were called Arnoldists.

ARNOLD, Abraham Kerns, an American soldier: b. Bedford, Pa. 1837, March 24, d. 1901. He was educated at West Point, and commissioned 1st lieutenant, Fifth Cavalry, 1862, July 17. He was brevetted captain for gallant and meritorious service in the battle of Gaines' Mill, Va., and major for similar service at the battle of Todd's Tavern, Va. He received a Congressional medal of honor for gallantry in action at Davenport Bridge, Va., 1864, May 18. He commanded the field operations in south-eastern Arizona against the Apaches in 1879, and against the Crows in 1887. During the Spanish-American war he commanded the 2d Division of the 7th Army Corps in Cuba. He wrote *Notes on Horses for Cavalry Service* (1869).

AR'NOLD, Sir Arthur, an English statesman and author; b. 1833; d. 1902. He acted as assistant commissioner to administer the Public Works Acts during the cotton famine, 1863–6, and afterward wrote *The History of the Cotton Famine.* Other literary productions have been: *From the Levant* (1858); *Through Persia by Caravan*; *Social Politics,* and *Free Land.* He sat in Parliament as a Liberal member for Salford, 1880–5. Established and was president of the Free Land League from 1885 to 1895; was chairman London County Council, 1895 and 1896, and was knighted in June 1895. He was a brother of Sir Edwin Arnold (q. v.).

ARNOLD, Benedict, a colonial governor of Rhode Island: b. England 1615, Dec. 21; d. 1678, June 20. He was a leader of the opposition to Samuel Gorton's settlement at Pawtuxet, 1641. His knowledge of Indian languages enabled him to effect important negotiations with the Indians in 1645. In May 1657 Arnold succeeded Roger Williams as president of the colony, and upon the granting of the royal charter to the colony in 1663, was made the first governor, being re-elected in 1664, 1669, 1677, 1678. He took an active part in the reconciliation and union of the two colonies of Rhode Island and the Providence plantations. The famous windmill at Newport, whose erection was long ascribed to the Northmen, appears to have been built by him.

ARN'OLD, Benedict: 1740–1801; b. Norwich, Conn., of respectable parentage. He was educated at the common school, being intended for a merchantile life. He was twice apprenticed to druggists, and each time ran away to enlist in the army, only to desert at the risk of his life. He finally began the drug business on his own account in New Haven, but failed under suspicious circumstances. He seems to have been fascinated with the surroundings of military life, and, being plausible, obtained the captaincy of a local militia regiment. When the revolution broke out, A. entered the service of his country, and was appointed colonel. He gained distinction by vigorous action on Lake Champlain, but his dishonesty soon involved him in difficulty with the Massachusetts committee of safety, and he resigned in anger. He returned to the service,

however, and was appointed, with Gen. Montgomery, to the command of an expedition against Quebec, which failed, and in which Montgomery was killed and A. severely wounded. He was invalided at Montreal, where some disgraceful transactions added to the heavy cloud on his reputation. He somewhat redeemed himself, 1776, Oct., when, on Lake Champlain, he fought a brilliant naval engagement with a much larger force of the enemy, in which his daring gave him the name of a hero among his countrymen. Soon after this, the action of congress, in naming five major-generals from among officers his juniors in rank and his inferiors in ability, roused an implacable resentment which opened his way to treason. When the English evacuated Philadelphia A. was sent there in command. Here he lived extravagantly, ran into debt, and was accused of the meanest peculation, and was tried by court-martial and sentenced to be reprimanded by the commander-in-chief. This painful duty was performed by Washington as gently as possible, but A. was more embittered than before. Washington, who still had confidence in him, at his solicitation placed him in command of the important post of West Point. A. entered at once into negotiations with Sir Henry Clinton for the surrender of this charge to the British, for a stipulated reward of a brigadier-general's commission in the British army and the promise of £30,000. The accidental arrest of Major André (q. v.) ,the agent of Clinton in effecting the negotiations, and the discovery of his papers, resulted in the exposure of A.'s treachery, and the securing of West Point from danger. André was hung as a spy, Arnold escaped, 1780, Sep., on broad the sloop-of-war *Vulture*, entered the British service, received £6,000 and a commission, and afterward engaged in some depredations on the James river. Later, he was sent to attack New London, Conn. At the close of the war he retired to England, and afterward did some business in New Brunswick and Guadeloupe; but his latter days were passed obscurely in London, where he died, followed by the contempt even of those in whose interest he had sought to betray his country. A. married, 1779, Miss Shippen, of Philadelphia, who died 1796; he had several children.

AR'NOLD, Sir Edwin: author: b. Rochester, England, 1832, June 10; d. 1904, March 24. He graduated at Oxford Univ. 1854; was appointed principal of the govt. Sanskrit College at Poona, India, and fellow of the Univ. of Bombay; resigned 1861 and became editorially connected with the London *Daily Telegraph*. Besides editorials, criticisms, and reviews, he published *Belshazzar's Feast*, prize poem, (1853); *Poems, Narrative and Lyrical; Griselda, a Drama; Education in India; The Euterpe of Herodotus; The Book of Good Counsels; The Poets of Greece; Hero and Leander* (1874); *The Indian Song of Songs* (1875); *The Light of Asia* (1879); *Indian Poetry* (1881); *Pearls of the Faith* (1883); *The Song Celestial* (1885); *Lotus and Jewel* (1888); *The Light of the World*

(finished 1890); *Potiphar's Wife and Other Poems; India Revisited; Japonica; The Tenth Muse and Other Poems; East and West* (1896); *The Voyage of Ithobal* (1901).

ARNOLD, Edwin Lester, an English author, son of Sir Edwin Arnold. He has written *A Summer Holiday in Scandinavia* (1877); *On the Indian Hills, or Coffee Planting in Southern India* (1881); *Bird Life in England* (1887); *England as She Seems* (1888); the novels *Phra, the Phœnician* (1890), *The Story of Ulla* (1895); *Lepidus the Centurion.*

AR'NOLD, George, an American poet: b. New York city, 1834, June 24; d. New Jersey, 1865, Nov. 3. Adopting literature as a profession he contributed prose and verse to *Vanity Fair, The Leader*, and other periodicals of his day. The "Macarone" papers established his reputation as a humorist, and the *Jolly Old Pedagogue* is his best known poem. During the Civil War he did military duty at one of the forts on Staten Island. His published volumes are: *Drift: a Seashore Idyl* (1866); *Poems, Grave and Gay* (1867); *Poems,* ed. with a Biographical Sketch by Wm. Winter (1870).

ARNOLD, *ar'nōlt*, Hans, the pseudonym of Bertha von Bulow. See Bulow, Bertha von.

ARNOLD, Isaac Newton, an American lawyer and author: b. Hartwick, Otsego County, N. Y., 1815, Nov. 30; d. Chicago, 1884, Apr. 24. Admitted to the bar in 1835, he removed in 1836 to Chicago, where he resided the remainder of his life, engaged in legal practice and taking an active part in politics. From 1861 to 1865 he was a member of Congress, and had a prominent share in measures leading to the abolition of slavery. His ablest speech was on the confiscation bill, 1862, May 2. Upon his retirement from Congress President Johnson appointed him an auditor of the United States treasury. A lifelong friend and intimate of Lincoln, he wrote *History of Abraham Lincoln and the Overthrow of Slavery,* (1867; new ed. 1885). His *Life of Benedict Arnold; His Patriotism and His Treason* (1879), is in the nature of an apologia. *Recollections of the Early Chicago and Illinois Bar* appeared in 1880.

ARNOLD, (*âr'nōlt*), Johann Georg Daniel, an Alsatian dialect poet and jurist; b. Strassburg, 1780, Feb. 18; d. there, 1829, Feb. 18. His lyrics (in High German) are meritorious but he is at his best in *Pentecost Monday* (1816), a comedy in Strassburg dialect and rhymed Alexandrine verse, pronounced by Goethe 'an incomparable monument of ancient Strassburg custom and language, a work which in clearness and completeness of intuition and ingenious delineation of detail can scarcely be equaled.' He was a professor in the College of Strassburg and wrote a notable legal work entitled *Elementa Juris Civilis Justinianei cum Codice Napoleoneo et Religuis Legum Codicigus · Collata* (1812).

AR'NOLD, Jonathan: patriot: 1741, Dec. 14—1798, Feb. 2; b. Providence, R. I. He was a member of the

colonial assembly of R. I. 1776, entered the revolutionary army as a surgeon, and afterward had charge of a hospital. He removed to St. Johnsbury, Vt., served one term in the continental congress, and was judge of the Orange co. (Vt.) court 16 years.

ARNOLD, Lewis G., an American soldier: b. New Jersey, 1815; d. 1871. Educated at West Point he served as second lieutenant in the second Seminole war (1837–8) and was in active service during the war with Mexico. He distinguished himself in the Federal army during the civil war, retiring from the service with the rank of lieutenant-colonel of regulars in 1864.

AR'NOLD, Matthew: English literary critic and poet: 1822, Dec. 24—1888, Apr. 15; eldest son of Dr. Thomas A. of Rugby, educated at Winchester and Rugby. He greatly distinguished himself at Oxford, where, 1845, he was elected a fellow of Oriel College. In 1851 he was appointed an inspector of schools; and in 1857 prof. of poetry at Oxford, which position he resigned 1867. In 1859 and again 1865, he was sent by the govt. in connection with the commission appointed to inquire into the state of education in France, Germany, and Holland. In 1883 a pension of £250 was conferred on him, and in the same year he lectured in the United States, where he was received with great respect, though with no great enthusiasm. His lecture on 'Emerson,' refusing him the high rank as poet and philosopher usually assigned him, provoked much hostile criticism. A. held the honorary degrees of Edinburgh and Oxford, and an Italian order.

A. was known first as a poet of classic taste and exquisite purity of imagination, but his writings in later years were almost exclusively in prose. His chief productions in verse are *Poems* (1853), containing, among other fine pieces, *Sohrab and Rustum, Tristram and Yseult, Balder,* and *Merope* (1858), an attempt to naturalize in English literature the form of the Greek drama; and *New Poems* (1867). His prose writings are numerous. Among the chief are lectures on *Translating Homer* (1861); *Report on Education in France, Germany and Holland* (1861); *A French Eton, or Middle-class Education and the State* (1864); *Essays on Criticism* (1865); *Lectures on the Study of Celtic Literature* (1867); *Schools and Universities of the Continent* (1868); *Culture and Anarchy, an Essay in Political and Social Criticism* (1869); and *Higher Schools and Universities in Germany* (1874). In *St. Paul and Protestantism* (1870), and still more in *Literature and Dogma* (1872), he startled the public by his piercing and audacious application of literary criticism to religion. In 1875 he published *God and the Bible;* in 1877, *Last Essays on Church and Religion;* in 1879, *Mixed Essays;* and in 1882, *Irish Essays, and Others.* He delivered interesting public addresses. He repeatedly evinced a happy faculty for doing the right thing at the right moment. The storms of controversy and attack which his telling and keen criticism of manners caused, never ruffled him, or led him

to retort in kind. His phrases became current coin, his cutting 'labels' stuck to the things he satirized and have passed into permanent use. This gift of sending forth phrases to ring through and be accepted by a whole generation is a rare power. Forever associated with him in the sense in which he used them are the now proverbial expressions, 'Philistinism,' 'the great style,' 'the young lions of the press,' 'the Zeit Geist,' 'the note of provinciality,' 'sweet reasonableness,' 'sweetness and light,' 'the stream of tendency, not ourselves that makes for righteousness.' It was his expressed wish that he should not form the subject of a biography. In 1895 his letters from 1848 to 1888 were gathered and edited in two volumes by G. W. E. Russell. These were written almost entirely to members of his family and close friends, and show him in the happiest light. Contemporary literature is filled with criticism of the various aspects of Arnold's work. A few of the more important studies are: Fitch, *Thomas and M. Arnold* (1897); Robertson, *Modern Humanists* (1891); F. Harrison, *Tennyson, Ruskin, and Mill, and Other Literary Estimates* (1900), an excellent appreciation; Brownell, *Victorian Prose Masters* (1902); Walker, *The Greater Victorian Poets* (1895); A. Galton, *Two Essays Upon Matthew Arnold* (1897).

AR'NOLD, Richard: 1828, Apr. 12—1882, Nov. 8; b. Providence, R. I. He graduated from West Point 1850, was connected with the exploration of the route of the Northern Pacific railroad, rendered distinguished services in the civil war, and rose to the rank of brevet maj.gen. U. S. A., and was afterward in command of various forts. He died at Governor's Island, N. Y.

AR'NOLD, Samuel, an English composer: b. London, 1740; d. 1802. In 1760 he was appointed a composer at the Covent Garden Theatre, and set to music the *Maid of the Mill.* He also produced the oratorios of the *Prodigal Son,* the *Resurrection,* and others. He was made a doctor of music in 1773, and in 1783 was appointed organist of the chapel royal. He edited the works of Handel, in 36 volumes folio. In 1794 he was made organist at Westminster Abbey. In 1708 he composed his oratorio of *Elijah.* Various as were his compositions, his inventive talent was but limited. His *Cathedral Music* was published in 1790.

AR'NOLD, Samuel Greene, an American historian: b. Providence, R. I., 1821, April 12; d. there, 1880, Feb. 12. He was graduated from Brown University in 1841, and traveled extensively in Europe, South America, and the East. He was lieutenant-governor of Rhode Island 1852, 1861–2, and sat for part of a term in the United States Senate, 1862–3. He wrote a valuable *History of Rhode Island and Providence Plantations* (2 vols., 1860), and was for many years president of the Rhode Island Historical Society.

AR'NOLD, Thomas, an English writer on literature.

and editor of old texts, son of Dr. Arnold of Rugby, and brother of Matthew Arnold: b. in Laleham, 1823, Nov. 30; d. 1900. He became a Roman Catholic, and spent a number of years in New Zealand and Tasmania. Among his works are *A Manual of English Literature*; *Select English Works of Wyclif* (3 vols., 1869); *Selections from the Spectator, Beowulf* (text, translation, and notes); *Henry of Huntingdon, Symeon of Durham*; and *Chronicles of the Abbey of Bury St. Edmunds*; *Passages in a Wandering Life* (1900). His daughter is the novelist, Mrs. Humphry Ward.

AR'NOLD, Thomas, D.D.: head-master of Rugby School, England: 1795, June 13—1842, June 12; b. West Cowes, in the Isle of Wight. In 1807 he was sent to the public school of Winchester, where he remained till 1811, when he was elected a scholar of Corpus Christi College, Oxford. In 1815 he was elected fellow of Oriel College; and he gained the chancellor's prize for the two university essays, Latin and English, 1815, 17. As a boy, he is said to have been shy and retired; as a youth, disputatious, and somewhat bold and unsettled in his opinions; but before he left Oriel, he had won the good opinion of a college which at that time boasted such names as Copleston, Davison, Whately, Keble, Hawkins, and Hampden. He took deacon's orders 1818, and the year afterward settled at Laleham, near Staines, where he occupied himself in preparing pupils for the university. In 1820 he married Mary, sister of one of his earliest school and college friends, and youngest daughter of the Rev. John Penrose, rector of Fledborough, Nottinghamshire. About ten years were spent in this quiet and comparatively obscure life; he was preparing himself for the arduous post that he afterward occupied; he was maturing his opinions, and he had also already commenced his great literary undertaking, the *History of Rome*. It was a period which he himself was accustomed to look back upon with some regret. His letters at this epoch reveal a fine ambitious spirit bending cheerfully to the task of tuition, more useful than glorious; they show also that those religious and political views which afterward distinguished him were being matured in the privacy of Laleham. 'I have long had in my mind,' he thus writes to a Mr. Blackstone, 'a work on Christian politics, or the application of the Gospel to the state of man as a citizen, in which the whole question of a religious establishment, and the education proper for Christian members of a Christian commonwealth, would naturally find a place. It would embrace also an historical sketch of the pretended conversion of the kingdoms of the world to the kingdom of Christ in the 4th and 5th c., which I look upon as one of the greatest *tours d'adresse* that Satan ever played. . . .I mean that by inducing kings and nations to conform nominally to

Christianity, and thus to get into their hands the direction of Christian society, he has in a great measure succeeded in keeping out the peculiar principles of that society from any extended sphere of operation, and insuring the ascendency of his own.' At Laleham A. became acquainted with Niebuhr's *History of Rome*. This was an era in his life. It produced a revolution in his historical views, and his own *History of Rome* became modelled almost too faithfully on that of the great German.

From Laleham he was called to the arduous duties of the head-mastership of Rugby School. On these he entered 1828, Aug.; and here he carried nearly to perfection his system of public education. He produced and maintained among the boys a high tone, moral and religious. He had the tact to make himself both loved and feared. He guided with great dexterity the *public opinion of the school*. 'In the higher forms,' says his biographer, 'any attempt at further proof of an assertion was immediately checked. "If you say so, that is quite enough; of course I believe your word;" and there grew up in consequence a general feeling that it was a shame to tell A. a lie—he always believes one.' On one occasion, when he had been compelled to send away several boys, he said: 'It is *not* necessary that this should be a school of 300, or 100, or of 50 boys, but it *is* necessary that it should be a school of Christian gentlemen.' But the school was far from occupying the whole energies of A. The *History of Rome* went on; he took part in all the great questions of the day, political and theological. In politics he was a whig, without being fettered by the ties of party. In the theological discussions of the day he was distinguished chiefly by his broad views of the nature of a Christian church. It was his leading idea that a *Christian people* and a *Christian church* ought to be synonymous expressions. He would never tolerate that use of the word church which limited it to the clergy, or which implied in the clergy any peculiar sacredness, or any traces of mediatorial function. The *priest* was unknown to him in the Christian community; this placed him at once in antagonism to the High Church party; and even clergymen of the Low Church complained that he did not set sufficient value on their sacred order. But all men, of whatever party, admitted and admired the zeal with which he taught that the full spirit of Christianity should permeate the whole civil or political life. If he seemed to lower the altitude of the clergy, it was only because he would raise the general level of the laity. As an Englishman, he was convinced that 'the founders of our present constitution in church and state did truly consider them to be identical, the Christian nation of England to be the church of England; the head of that nation to be, for that very reason, the head of the church.' It may be doubted whether this is quite historically correct; but it certainly presents a noble theory to the imagination.

In domestic life, Dr. A. was most happy; here he was distinguished by unfailing cheerfulness and amiability. In 1832 he purchased Fox How, a small estate between Rydal

and Ambleside, and in this charming retreat he enjoyed in the vacations, among the family circle, his own uninterrupted studies. Fox How has become a classical spot to tourists. For a brief time he held a place in the senate of the London Univ.; he resigned the seat on finding that he could not introduce some measures which he had at heart. In 1842 he received from Lord Melbourne the offer of the Regius professorship of modern history at Oxford. This appointment he accepted with peculiar gratification. He delivered some introductory lectures, which were heard with enthusiastic interest; and it was his intention, on his retirement from Rugby, to enter with zeal on the duties of his professorship. But this and all other literary enterprises were cut short by a sudden and painful death. The last vacation was at hand, the journey to Fox How was to be taken in a few days, when he was seized with a fatal attack of spasm of the heart. Few biographies end more abruptly or more mournfully; but the sufferer met his death with perfect fortitude and in the full Christian hope.—His principal works are *five vols. of sermons;* the *History of Rome* (3 vols.), broken off by his death at the end of the second Punic war; and an *edition of Thucydides.* See *Life and Correspondence of A.*, by the Rev. A. P. Stanley, afterward Dean of Westminster (1845; 12th ed., with additions, 1881).

AR'NOLD, Thomas Kerchever: 1800–1853, March 9; b. Stamford, England: clergyman and author of educational works. He graduated at Oxford 1821; was appointed rector of Lyndon, Rutlandshire, 1830, and there continued till his death. He published his *Greek Prose Composition* 1849, and his *Latin Prose Composition* 1850; both works had an instant great success. He compiled, with J. E. Riddle, an *Eng.-Lat. Lexicon,* pub. 1847.

ARNOTT, or Arnut, n. *ar'nŭt* [AS. *eorthnot:* contr. for *earth-nut*]: a sort of nut-like root, commonly found in hilly grass-pastures, its presence in the earth being indicated by its tuft of white flowers on a slender stem; the tuberous roots of *Bunĭum bulbocăs'tănum* and *B. flexuōsum,* ord. *Umbelliferæ,* eaten under the name of pig-nuts or earth-nuts.

AR'NOTT, Neil, m.d.: 1788–1874, March 2; b. Arbroath; educated at the grammar school of Aberdeen, and at Marischal College in the same city. A. studied medicine at Aberdeen and London; was some years in the naval service of the East India Company, and in 1811 a medical practitioner in London. He was appointed, 1815, physician to the French embassy, and afterward to the Spanish embassy. In 1836 Dr. A. was appointed a member of the senate of the Univ. of London. In 1837 he was named a physician extraordinary to the queen. He died in London. Besides his *Elements of Physics, or Natural Philosophy, General and Medical* (1827), Dr. A. pub. a treatise on *Warming and Ventilating* (1838), *On the Smokeless Fireplace, Chimney Valves,* etc. (1855), and other treatises. He made useful inventions (see Water-bed: Warming and Ventilation). His

genius showed itself in a very unusual combination of inventive power with the art of popular exposition.

ARNOTTO, or ARNATTO, n. *ăr-nŏt'tō*, or *ăr-năt'tō* [said to be a corrupted W. I. word]: also spelled ANNOTO, ANNOTTA, ANNATTO; also called ROUCOU, and on the continent of Europe, ORLEAN: a red coloring matter obtained in South America and the West Indies from the reddish pulp surrounding the seeds of the Arnotto-tree (*Bixa orellana*) by washing, maceration, fermentation, and subsequent evaporation. It appears in commerce in cakes or balls of 2 to 4 lbs. weight, wrapped in leaves, externally brown, internally of pale blood-red or yellowish-red color, and which have a peculiar animal smell and an astringent taste. Pure A. seldom appears in the market. It is obtained by the mere rubbing off and drying of the red pulpy pellicle which covers the seed; but that which is thus obtained is very pure, and occurs in small round or angular lozenges. The Indians rub this coloring matter into the skin of their whole body, thus intending both to adorn themselves, and to obtain protection against the bites of mosquitoes. A. is used in the medicine of civilized countries, for coloring plasters, ointments, etc.; and to a considerable extent by farmers for giving a rich color to butter and cheese. It is also used in dyeing, although it does not produce a durable color. It is employed to impart an orange tint to simple yellows. It is an ingredient in some varnishes. It dissolves in alkalies, producing a brown solution, from which it is precipitated by acids. It imparts little color to water, but dissolves in alcohol; alcohol and sugar of lead throw down a brick-red precipitate from the alcoholic solution. In South America, A. is very extensively mixed with chocolate, not only for the sake of the color, but also for the improvement of the flavor.—The genus *Bixa* belongs to the natural order *Flacourtiaceæ* (q.v.), and is distinguished by complete flowers with simple stigma, a hispid calyx of five sepals, and a two-valved capsule. The A. shrub is a native of tropical America, but has been introduced into other warm countries. It grows to the height of 7–8 ft., and has heart-shaped, pointed leaves and large flowers of a peach-blossom color, which grow in loose clusters at the extremities of the branches. The capsules are oblong, and contain 30–40 seeds enveloped in red pulp (the A.). The seeds are said to be cordial, astringent, and febrifugal. The roots are used in broth. They have the properties of A. in an inferior degree.

ARNSBERG, *ârns'bĕrg:* one of the three depts. of the Prussian province of Westphalia (q.v.), having 2,900 sq. m. With the exception of the valley of the Lippe, the whole dept. belongs to the highlands of the Lower Rhine. Only in a few of the valleys is there good arable soil; on the other hand, there is a great deal of good timber, more than a third of the whole area consisting of forests. But the principal resources of the district are its subterranean riches, in coal, iron, lead, silver, etc. Its abundant water-

power has also led to the establishment of numerous factories, mills, etc. Pop. about 1,500,000.

ARNSBERG, chief town of the dept., is on the Rhur, 44 m. s.e. from Münster. It has several manufactures, such as paper, linen, broadcloth, potash, etc. In the orchard below the castle is still pointed out the spot where the famous Femgerichte (q. v.) of A. was held. Pop. (1900) 8,448.

AROINT, or AROYNT, ad. *ă-roynt'* [OE. *rynt*, begone; get out of the way: Icel. *ryma*, to make room: said to be a corruption of L. *averrun'cus*, averting evil, but hardly probable]: in OE., begone; away; avaunt thee.

AROMA, n. *ă-rō'mă* [Gr. *arōma:* F. *arome*]: the fragrant principle in plants; an agreeable odor or smell. AROMATIC, a. *ăr'ō-măt'ĭk*, or AR'OMAT'ICAL, a. spicy; fragrant. AR'OMAT'ICALLY, ad. *-lĭ*. AROMATICS, n. plu. *ăr'ō-măt'ĭks*, spices or perfumes. AROMATIZE, v. *ă-rō'mă-tīz*, to render fragrant; to perfume. ARO'MATIZ'ING, imp. ARO'MATIZED, pp. *-tīzd*. AROMATIZATION, n. *ă-rō'mă-tī-zā-'shŭn*, the act of rendering aromatic. AROMATIZER, n. *ă-rō'mă-tī'zĕr*, one who. AROMATOUS, a. *ă-rō'-mă-tŭs*, full of fragrance; impregnated with a fine odor.

AROMA: term sometimes employed to designate substances whose extremely minute particles are supposed to affect the organ of smell so as to produce particular odors, and frequently as synonymous with *odor*. The particles diffused through the atmosphere, and affecting the olfactory nerves—if the theory of particles of matter so diffused be correct—must indeed be extremely minute, as odoriferous substances such as musk, the smell of which is felt at a considerable distance, continue to diffuse their odor, and according to this theory, these particles, for years, without sensible diminution of weight. See NOSE, etc. The term A. is usually employed only with reference to particular kinds of odors, not easily defined or distinguished in words. Thus, we speak of the A. of roast meat, and of the A. or *aromatic* smell of hyssop, mint, and other plants. Aromatic smells are very characteristic of some natural orders of plants, as *Labiatæ* (Mint, etc.) and *Compositæ* (Milfoil, etc). They have been generally supposed to depend upon essential oils, but resins are often equally aromatic.

AROMAT'ICS: a class of medicines, which owe their properties to the essential oils, to benzoic and cinnamic acids, to volatile products of distillation, or to odorous glandular secretions. The plants that contribute to this class of medicines are those which yield essences, camphor, or odorous resins, and among the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Aurantiaceæ, Coniferæ, Scitamineæ, Orchideæ, etc. In some cases, the aromatic matter is diffused through all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger and galanga; or the bark, in the case

of cinnamon, canella, and cascarella; or the flowers, as in the case of cloves; or the fruit, as in the case of anise and vanilla; or the wood, as in the case of sandal-wood and aloes wood; or the leaves, as in the case of most of the Labiatæ, Umbelliferæ, etc. As a general rule, these substances act as diffusible stimulants of more or less power, and as antispasmodics, while those in which a bitter principle is present act as vermifuges and tonics. The whole class was formerly regarded as possessing disinfectant and antiseptic properties, and some, as coal-tar, creosote, etc., strongly possess this property.

AROMATIC VINEGAR; differing from ordinary vinegar (which is acetic acid diluted with water) in containing certain essential oils which impart an agreeable fragrance. It is generally prepared by adding the oils of cloves, lavender, rosemary, and *Acorus Calamus* (and sometimes camphor) to crystallizable acetic acid, or by distilling the acetate of copper in an earthen retort and receiver, and treating the liquid which passes over with the fragrant oils mentioned above. A. V. is a very pleasant and powerful perfume; it is very volatile, and when snuffed up by the nostrils is a powerful evcitant, and hence is serviceable in fainting, languor, headache, and nervous debility. A. V. is generally placed on a sponge in a smelling bottle or in a *vinaigrette;* it can also be purchased as a liquid in phials; and a drop or two allowed to evaporate into a sickroom overpowers, but does not destroy, any unpleasant odor. The liquid must, however, be cautiously dealt with, as it is highly corrosive.

ARONIA: see CRATÆGUS.

AROOSTOOK, *a-rôs'took:* river rising in the n. of Maine, and emptying into the St. John in New Brunswick, after a course of abt. 120 miles. It has historical interest from its connection with the long-agitated question of the n.e. boundary between British America and the United States.

AROSE, v. *ă-rōz:* see ARISE.,

AROUND, prep. *ă-rownd* [*a,* on, and *round*]: about; on all sides: AD. in a circle; on every side.

AROURA, n. *ă-row'ră* [L. *arura;* Gr. *aroura*—from L. *aro;* Gr. *aroō,* to plow]: corn land; a corn-field; a Grecian measure of superficial extent, a quarter of a plethron, and containing one and a half hektoi. Porter makes it equivalent to 107.37833 sq. feet.

AROUSE, v. *ă-rowz'* [AS. *a,* intensive, and *rouse,* a secondary form of *raise*]: to stir up; to excite; to stir from rest to activity. AROUS'ING, imp. AROUSED, pp. *a-rowzd'.*

AROW, ad. *ă-rō'* [*a,* on, and *row*]: in a row; one after the other.

ARPEGGIO, h. *âr-pĕd'jō* [It.— from *arpa,* a harp]: in *music,* a chord of which the notes are given, not contemporaneously, but in quick succession, with a harp-like effect. From any one chord several forms of A. may be

produced. Bass chords thus treated form an *Alberti Bass*, so named from Domenico Alberti (1730), a popular singer and player, who often played the bass in this style. A. sometimes means a harp-accompaniment.

ARPENT, *ăr-pent:* old French land-measure, corresponding to acre. The name is from the ancient Gallic *aripennis*, identified by Columella with the Roman *actus*, or half *jugerum*. Ordinarily an A. may be reckoned as five-sixths of an acre; but the precise comparative value of the three most in use will be seen in the following table:

	French Hectares.
Acre, English imperial or statute,	0.40466
Arpent, of Paris,	0.32400
" d'ordonnance,	0.48400
" common,	0.40000

ARPINO, *âr-pē'nō*, the *Arpinum* of the ancients: t. of s. Italy, birthplace of Cicero and Caius Marius, in the province of Caserta, 65 m. n. by e. of Naples, on the lower ridge of a lofty hill, abt. 6 m. to the left of the river Garigliano, the ancient Liris. The old town, in early Roman times, was on the top of a steep rock, forming part of the territory of the Volscians. Many remains of the ancient structures are still seen, especially a cyclopean wall, which runs along the n. brow of the hill occupied by the present town, and extending to the ancient citadel. About B.C. 188, the citizens received the freedom of the city of Rome, with all its privileges, and Arpinum, during the later years of the republic, was a flourishing municipal town.

Manufactures of woolen cloth, parchment, paper, and leather are carried on. The town has a charming appearance from the highly picturesque woods and mountains around. Iron, white marble, variegated red marble, and marble of a yellowish color are got in mines and quarries in the neighborhood. Pop. abt. 10,000.

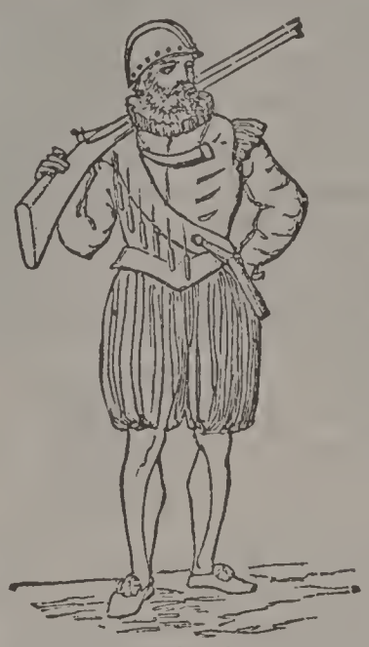
ARQUA, *âr-kwâ:* village in the prov. of Padua, Venice, 12 m. s.w. of Padua, in the heart of the Euganean Hills. Petrarch's furniture is still preserved in the house in which he died here (1374, July 18), and his monument of red marble is in the churchyard. Pop. abt. 1,000.

ARQUATED a. *âr'kwā-tĕd* [L. *arquatus*—from *arquus* (*arcus*) a bowl]: bent like a bow; curved.

ARQUEBUS, n. *âr'kwe-bŭs* [F. *arquebuse:* It *archibuso:* Dut. *hæck-busse*, a gun fired from a rest—from *haak*, a hook; *bus*, a gun]: an old-fashioned hand-gun. ARQUEBUSIER, n. *âr'kwe-bŭs-ēr'*, a soldier armed with an arquebus. ARQUEBUSADE, n. *âr'kwe-bŭs-ād'*, originally a shot-wound from an arquebus, now applied to a distilled water used for the cure of wounds or bruises; other spellings are, ARQUEBUSE, HARQUEBUSS, etc.

ARQUEBUS, or HARQUEBUS: the first form of hand-gun which could fairly be compared with the modern musket. Those of earlier date were fired by applying a

match by hand to the touchhole; but about the time of the battle of Morat, 1476, guns were used having a contrivance suggested by the trigger of the arbalest or cross-bow, by which the burning match could be applied with more quickness and certainty. Such a gun was the A. Many of the yeomen of the guard were armed with this weapon, on the first formation of that corps in 1485. The A. being fired from the chest, with the butt in a right line with the barrel, it was difficult to bring the eye down low enough to take good aim; but the Germans soon introduced an improvement by giving a hooked form to the butt, which elevated the barrel; and the A. then obtained the name of the *haquebut*. Soldiers armed with these two kinds of weapon were designated *arquebusiers* and *haquebutters*—the former were common in the English army in the time of Richard III., the latter in that of Henry VIII.



Arquebusier.

ARQUERITE, n. *ȧr'kĕ-rīt:* a native silver amalgam, occurring in crystals and arborescent crusts in the mines of *Arqueros*, near Coquimbo, in Chili.

ARQUIFOUX, n. *ȧr'kwĭ-fō* [F.]: in *commerce*, an ore of lead used by potters to give a green varnish to the articles which they manufacture.

ARRACACHA, *ȧr-ră-kȧ'chă* (*Arracacha esculenta*): plant of the natural order *Umbelliferæ*, native of the elevated table-lands in the neighborhood of Santa Fê de Bogota and Caraccas, and of regions of similar climate in other parts of tropical America. It is much cultivated in its native country for its roots, used as an esculent. The root divides into a number of parts, which resemble cows' horns or large carrots. When boiled, they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is very like hemlock, and has a similar heavy smell. Humboldt, indeed, referred it to the genus *Conium* (Hemlock), but it has since been made the type of a new genus. The flowers are in compound umbels, and are of a dull purple color. The A. was at one time very strongly recommended as a substitute for potatoes; it was introduced into Britain through the exertions of the Horticultural Soc., and its cultivation perseveringly attempted, but it has been found unsuitable to the climate of Britain

Arracacha.

and of other parts of Europe, where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. The climate of the s. of Ireland resembles that of its native regions more than any other in the British Islands. It seems to require a very regular temperature and constant moisture. In deep, loose soils, it yields a great produce. It is generally propagated, like skirret, by offshoots from the crown of the root. By rasping the root and washing, a starch, similar to arrow-root, is obtained,—There is another species of the same genus, *A. moschata*, a native of the same regions, the root of which is uneatable.

ARRACK, n. *ăr'răk* [Ar. *araq*, sweat, juice], (called also Rack or Raki): the East Indian name for all sorts of distilled spirituous liquors, but chiefly for that procured from toddy or the fermented juice of the cocoa and other palms, and from rice. The palms in other tropical countries furnish a fermented beverage similar to the toddy of India, and in a few instances also it is distilled, but arrack essentially belongs to India and the adjacent countries. The cocoa-nut palm (*Cocos nucifera*) is a chief source of toddy or palm wine, and is obtained from trees ranging from twelve to sixteen years old, or when they show the first indication of flowering. After the flowering shoot or spadix enveloped in its spathe is well advanced, and the latter is about to open, the toddy-man climbs the tree and cuts off the tip of the flower-shoot; he next ties a ligature round the stalk at the base of the spadix, and with a small cudgel he beats the flower-shoot, and bruises it. This he does daily for a fortnight, and if the tree is in good condition, a considerable quantity of a saccharine juice flows from the cut apex of the flower-shoot, and is caught in a pot fixed conveniently for the purpose, and emptied every day. It flows freely for fifteen or sixteen days, and less freely day by day for another month or more; a slice has to be removed from the top of the shoot very frequently. The juice rapidly ferments, and in four days is usually sour; previous to that, it is a favorite drink known in India by the natives as callu, and to the Europeans as toddy. When turning sour, it is distilled and converted into A., known better to the Hindus by the name of naril, and by the Cingalese as pol or nawasi. A similar spirit is made largely from the magnificent fan-leaved palm, *Borassus flabelliformis*, and also from the so-called date-sugar palm, *Areuga saccharifera*. Large quantities of arrack are made from fermented rice prepared as malt—both in India, Ceylon, and Batavia; in the last-mentioned place, sugar and molasses are added to the rice.

It is probable that the use of arrack is more widely diffused among the human race than the produce of the vine (wine and brandy) and of barley (whisky, beer). The date-palm of the Sahara, the oil-palm of w. Africa, and the cocoa-nut palm of the Pacific Islands are made to yield it.

The unscientific method of preparing these alcoholic

spirits renders them generally very distasteful to European taste, the process of rectification being rarely if ever employed. Some carefully prepared samples of great age, however, find favor, and are used in making punch and other drinks, not only in India and Java, but small quantities also find their way to Britain, for the gratification of palates trained in India. The cocoa-nut tree is especially valuable for this industry, because it bears twelve times in the year after it once begins, and continues bearing for as much as forty years. It is the rule, therefore, to prevent undue exhaustion of so valuable a tree, to discontinue the collection of juice at intervals, and allow the natural process of fruit-bearing to go on: in this way, it is usual to divide the year between the two crops. Of late years a considerable amount of rum has been produced in the East Indies from the sugar-cane and the molasses yielded by it. This is often called arrack by the natives, and leads to errors as to the statistics of the latter material. The word *Saki,* used by the Japanese for rice spirit, seems only an alteration of *Raki* or Arrack. An imitation A. is prepared by dissolving benzoic acid in rum, in the proportion of 20 grains of the former to 2 pounds of the latter.

ARRAGONITE, n. *ăr-răg'ŏ-nīt* [*Arragon,* in Spain]—also spelled ARAGONITE: a mineral essentially consisting of carbonate of lime, and so agreeing in chemical composition with calcareous spar (q.v.), but differing from it in the form of its crystals, of which the primary form is a rhombic prism with angles of 116° 16′ and 63° 44′, the secondary forms being generally prismatic and pyramidal. The effect of heat on them shows another difference, A. being reduced to powder by a heat in which calcareous spar remains unchanged. Such differences between minerals of the same chemical composition appeared very improbable, and when Stromeyer, 1813, detected the presence of a little carbonate of strontia in A., they were immediately ascribed to this as their cause; but it has since been shown not only that the quantity of strontia is very small, variable, and therefore to be regarded as accidental, but also that the differences between the two minerals may be accounted for by difference of temperature when crystallization was taking place. A. appears to be the product of a crystallization taking place at a higher temperature than that in which calcareous spar is produced; and accordingly it is frequent in volcanic districts and in the neighborhood of hot springs, as at Carlsbad. It is frequently found in trap-rocks, as in Scotland. It sometimes occurs stalactitic. Its crystals are sometimes prisms shortened into tables, sometimes they are lengthened into needles. Twin crystals (*macles*) are very common. *Satin Spar* is a variety of it, in which the crystals are of a fine fibrous silky appearance, and combined together into a compact mass. *Flos ferri* (i.e., flower of iron) is a name given to a coralloidal variety which sometimes occurs in iron mines.

ARRAH, *âr'râ:* largest town in the dist. of Shahabad

Bengal; administrative headquarters of the district. It is a municipality, in a fertile country. It is on the route between Dinapore and Ghazipore, 25 m. w. of the former, and 75 m. e. of the latter. During the mutiny of 1857, A. was of interest second only to Cawnpore, Delhi, and Lucknow, connected as it was with a heroic defense, a heavy disaster, and a brilliant victory. The defense was that of an isolated house, for eight days, against 3,000 sepoys with 2 field-pieces, the garrison consisting of less than 20 whites, all civilians, and 50 Sikhs, whose fidelity was doubtful till proved by trial. The disaster was the nocturnal surprise in the jungle of a detachment almost entirely European, sent to the relief of the beleaguered dwelling—the loss having been 290 out of 415. The victory was won by a force of 172 men, 12 of them mounted volunteers, and 3 guns, over a host numbering nearly 20 to 1. In fact, A., happily with the exception of the cold-blooded massacre of women and children, presented, in minature, nearly all the phases of the most formidable and eventful insurrection on record. Pop. of A. 47,000.

ARRAIGN, v. *ăr-rān'* [OF. *arraigner*, or *aragnier*, to discourse with, to arraign—from mid. L. *ad ratiōnēs stārĕ*, to plead—from *ratĭōnēs*, pleadings in a suit—from L. *ratĭōnem*, reason, argument]: to call one to account; to set as a prisoner at the bar of a court of justice; to charge with faults; to accuse publicly. ARRAIGN'ING, imp. ARRAIGNED, pp. *ăr-rānd'*. ARRAIGN'ER, n. one who. ARRAIGNMENT, n. *ăr-rān'mĕnt*, the act of setting a prisoner before the bar of a court for trial; accusation.—SYN. of 'arraign': to accuse; impeach; censure; charge; criminate; indict.

ARRAIGN'MENT, in the practice of the Criminal Law: calling a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. And having the presumption of innocence in his favor, it is the law, and so laid down in the most ancient books, that, though charged upon an indictment of the highest nature, he is entitled to stand at the bar in the form and in the garb of a free man, without irons or any manner of shackles or bonds, unless there be evident danger of his escape, or of violence at his hands. When arraigned on the charge of treason or felony, the prisoner is called upon by name to hold up his hand, by which he is held to confess his identity with the person charged. This form, however, is not an essential part of the proceedings at the trial, and it is sufficient for the prisoner, when arraigned, to confess his identity by verbal admission or otherwise. When thus duly arraigned, the indictment is distinctly read to the accused, and he then either confesses the fact—that is, admits his guilt—or he puts himself upon his trial by a plea of *Not Guilty*. Formerly, one of the incidents of the A. was the prisoner *standing mute*, as it was called—that is, refraining from, or refusing, a direct answer to the indictment; in which case the court proceeded

to inquire whether the silence was of malice on the part of the prisoner, or was produced by the visitation of God, and to deal with him accordingly. But now it is lawful for the court to order the proper officer to enter a plea of 'Not guilty,' on which the trial shall proceed, as if the plea had been by the prisoner himself. Where there is reason to doubt, however, that the prisoner standing mute is sane or not, inquiry is had forthwith, resulting either in the entering of the plea 'Not guilty,' or in delivering to custody of a prisoner found insane.

According to Sir Matthew Hale, the term A. is derived from *arraisoner, ad rationem ponere,* to call to account or answer, which in ancient French law would be *ad-resoner*, or, abbreviated, *a-resner*. See TRIAL: INDICTMENT: INFORMATION: PROSECUTION: PLEA: VERDICT: NOT PROVEN.

AR'RAN: island in the mouth of the Firth of Clyde, Scotland; about 5 m. s.w. of Bute, 13 w. of Ayrshire, and 4 e. of Cantire, from which it is separated by Kilbrennan Sound. It is of oval form, about 20 m. long and 12 broad; 165 sq. m., of which about 15,000 acres, or a seventh part, are cultivated. The general aspect of A. is mountainous and heathy, and in the n. the jagged peaks are singularly grand. Around the coast is a low belt of ground, with lofty cliffs on the s. and s.w., from which the country rises abruptly. The highest point is Goatfell (in Gaelic named *Gaoth Bheinn* or *Beinn Ghaoith*, 'Wind Mountain'), an obtuse pyramid, 2,865 ft. high, a prominent feature of the island. From its sides slope the romantic glens of Rosa and Sannox, and at its base to the s.e. opens Brodick Bay, at the head of which lay, until lately, Brodick village. The houses which composed it have now been removed, and a new village has sprung up on the opposite side of the bay, called Invercloy, where there is a spacious hotel. To the s. of this, round a bluff headland, is Lamlash Bay, the chief harbor of A., and the best on the Firth of Clyde, sheltered by Holy Island, once the seat of a monastery. A picturesque mass of columnar basalt, 900 or 1,000 ft. high, succeeds. Farther s. lies Whiting Bay, near which are two cascades, 100 and 50 ft. high respectively. At the s.e. point of A. is Kildonan Castle, opposite which is the small isle of Pladda, crowned by a light-house. Large caverns are in the cliffs of the s. and s.w. coast. In one of these, 'the King's Cave,' in the basaltic promontory of Druimodune, Robert the Bruce hid himself for some time. Shiskan Vale, opening into Druimodune Bay, is the most fertile part of A. Loch Ranza, a bay in the n. end of A., runs a mile inland, and is a herring-fishing rendezvous. There is daily communication with A. by means of steamboats from the Clyde, the ports touched at being Brodick, Lamlash, and Corrie.

The geology of A. is almost unique, and displays a greater succession of strata than any other part of the British Isles of equal extent. The s.e. half of A. consists of Devonian sandstone, extending from the e. coast 4 or 5 m. inland, and running s.w. from Brodick beyond the centre of the

island; and of trap rocks and carboniferous strata, which occupy the middle and w. portions. The n.w. half consists of a central granite nucleus, including Goatfell, bordered on the w. by a tract of mica-slate, and on the n.e. and s. by lower Silurian rocks, which, again, have a run of Devonian sandstone on the e. and s. Lias and oolite lie on the mica-slate. The streams in A. are only rivulets, and one of them tumbles over a precipice 300 ft. high. Some level parts in the s. half of A. are fertile. The chief crops are oats and potatoes. Cattle, sheep, fish, and oats are exported. The greater part of A. belongs to the Duke of Hamilton, whose seat is Brodick Castle. A. forms part of the county of Bute, and contains two parishes. Many antiquities occur, such as cairns, unhewn obelisks, monumental stones, and Druidical circles. Several stone coffins were found in a cairn 200 ft. in circumference. Loch Ranza Castle, now in ruins, was once a residence of the Scots kings. Pop. of A. (1900), 6,000.

AR'RAN, South Isles of: three small islands lying n.e. and s.w. across the entrance to Galway Bay, about 4 m. off the w. coast of Ireland, and 27 w. of Galway city. They form the barony of A., and give the title of earl to the Gore family. Total area, 11,287 acres. The principal or w. island, Inishmore, is 7 m. long and 2 broad; Inishmaan, or 'Middle Isle,' is next; and then Inishere to the s.e. The islands consist of the carboniferous limestone of the bed of Galway Bay, and rise to the height of 100 to 200 ft. on the w. side, ending in cliffs facing the Atlantic. Most of the land is rudely cultivated. The chief crops are rye, oats, and potatoes. Most of the inhabitants engage in fishing; and the *corragh* or wicker-work skiff is still seen here. They are subject to famines from parching, rainless w. winds in August, destroying the potato-crop. These islands contained at one time 20 churches and monasteries. Inishmore was the centre of these, still known as Aran-na-naomh, or 'Arran of the Saints.' Many pilgrims still visit the old shrines and relics scattered through the islands. St. Kenanach Church, built in the 7th c., still stands, all but its stone roof, and the stone oratories and little bee-hive stone huts of the monks of the 6th and 7th centuries remain. There are nine circular cyclopean fortresses of unhewn, uncemented stones (portions of the walls still being 20 ft. high), supposed to have been built in the 1st c. by the Fir-Bolg or Belgæ. The largest of these, Dun-Aengus, on a cliff in Inishmore, 220 ft. high, is one of the most magnificent barbaric monuments in Europe. The majority of the inhabitants reside on the island of Inishmore, whereas both Inishmoan and Inishmere are sparsely populated. Roman Catholicism is the predominating religion, all but a few of the inhabitants adhering to that religion. Pop. (1903), 7,500.

ARRANGE, v. *ăr-rānj'* [F. *arranger*, to set in order—from F. *rang*, a row: W. *rhenc:* Scot. *raign*, a row, a ring]: to dispose in a row or line; to put into proper order;

to adjust; to dispose. ARRANG'ING, imp. ARRANGED, pp. *ăr-rānjd'*. ARRANG'ER, n. one who. ARRANGEMENT, n. *ăr-rānj'mĕnt*, putting into proper order; settlement; a classification.—SYN. of 'arrange': to adjust; accommodate; adapt; dispose; settle; prepare; determine.

ARRANG'ING, in Music: adapting a piece of music so as to be performed on an instrument or instruments different from those for which it was originally composed; as when orchestral or vocal compositions are set for the pianoforte, or the reverse. An arrangement is often a mere lifeless transposition of the original, the only guiding principle being the mechanical possibility of performance. Of this kind are most of the pianoforte arrangements of the orchestral works of Mozart, Beethoven, etc.—partly from the arranger working merely for hire, and partly from a mistaken reverence for, and fear of altering, the original. It is different when an arranger, who thoroughly comprehends the spirit of the original, takes advantage of the peculiar means of expression afforded by the new form of presentation, to reproduce as much as possible the original effects. In this last respect, the arrangements of Franz Liszt have excelled all others, although in some cases he may have overstepped the boundary of propriety. See POT-POURRI: FANTASIA.

ARRANT, a. *ăr'rănt* [AS. *eargian:* OE. *argh*, to be a coward: Ger. *arg*, bad: AS. *earg*, evil (see ARCH 2)]: notorious; impudent; infamous. AR'RANTLY, ad. *-lĭ*. *Note.*—Mr. Skeat says *arrant* is corrupted from Prov. and OE., *arghand*, timid, cowardly, the participle of *argh*, to be cowardly.

ARRAS, n. *ăr'răs* [*Arras*, a town in France where first made]: tapestry; hangings for rooms, woven with figures: see TAPESTRY.

ARRAS, *âr-râs'* (ancient *Nemetacum*): fortified town, cap. of Pas-de-Calais, as it was formerly of the province of Artois, France; on the banks of the Scarpe, partly on an eminence and partly on a plain; consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern railway, distant from Paris by this route 134 m., and from Brussels 97. The houses are of hewn stone; in the lower town they are handsomely built and uniform; the streets straight and wide, set off with several fine squares, and many beautiful public buildings. Among the principal edifices are the Cathedral of Notre Dame, the residence of the prefect, the town-hall, the theatre, and the public library.

A. ranks as a fortified town of the third class, its fortifications being the first that were constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since 390, and two ecclesiastical councils have been held here—in 1025 and in 1490.

The corn-market of A. is the most important in the n. of France. Its principal manufactures are iron-ware, woolen and cotton goods, hosiery, lace, pottery, and

leather. Its trade, which is considerable, is in corn and flour, oil, wine, and brandy, with the industrial products of the city.

It appears from the writings of Jerome that A. was remarkable for its woolen manufactures in his time; and during the middle ages it was famed for its tapestry; indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to the richly-figured hangings that adorned the halls of the kings and the barons.

In 1482 A. with Artois was ceded by the states of the Netherlands to Louis XI. of France; but the inhabitants having revolted, the king laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of A. Soon afterwards (1493) it was ceded to Maximilian of Austria, and was possessed by the Spanish branch of the House of Hapsburg till 1640, when Louis XIII. of France took it after a long siege. By the treaty of the Pyrenees, it was finally ceded to France. A. suffered much in the time of the first French revolution, especially in 1793. Robespierre, the Terrorist, was a native of the town. Pop. (1900), 26,000.

ARRAY, v. *ăr-rā′* [OF. *arroyer*, to set in order: It. *arredarĕ*, to get ready: Icel. *reida*, to lay out: Sw. *reda*, order]: to put in order; to prepare or dispose; to dress; to envelope: N. men drawn up for battle; dress. ARRAY′ING, imp. ARRAYED, pp. *ăr-rād*. ARRAY′ER, n. one who.—SYN. of 'array, v.': to arrange; dispose; dress; attire; apparel;—of 'array, n.': costume; habit; clothing; garments; vesture; raiment.

ARREARS, n. *ăr-rērz′* [F. *arriére*, away, behind: OF. *ariere*, backwards—from L. *ad*, to; *retro*, backwards]: a sum of money past due; what remains unpaid. ARREARAGE, n. *ăr-rēr′āj*, in *OE.*, that which remains unpaid; arrears.

ARREST, v. *ăr-rĕst′* [OF. *arrester:* F. *arrêter*, to detain, to arrest—from mid. L. *ar′restārĕ*, to arrest—from L. *ad*, *resto*, I stop: It. *arrestarĕ*]: to bring one to a stand; to lay hands upon any one, or upon his goods; to make a prisoner of; to stop; to hinder; to restrain; to seize by authority: N. hindrance; restraint; seizure by authority. ARREST′ING imp. ARRESTED, pp. *ăr-rĕst′ĕd*. ARREST′ER, n., or ARREST′OR, n. *-ẽr*, one who. ARREST′MENT, n. arrest (also see ATTACHMENT, in Law). ARRESTMENT OF WAGES (see GARNISH—etc.) AR′RESTA′TION, n. *-tā′shŭn* [F.]: an arrest or seizure.—SYN. of 'arrest, v.': to hold; detain; keep; retain; preserve; obstruct; delay; check; hinder; stop; seize; apprehend.

ARREST, in Law: to take into custody under authority of the law, on account of the suspicion or commission of crime, or to answer a demand in a civil suit. In civil procedure, A. may be defined as the execution of a judicial or prerogative order, in which the liberty of the person may

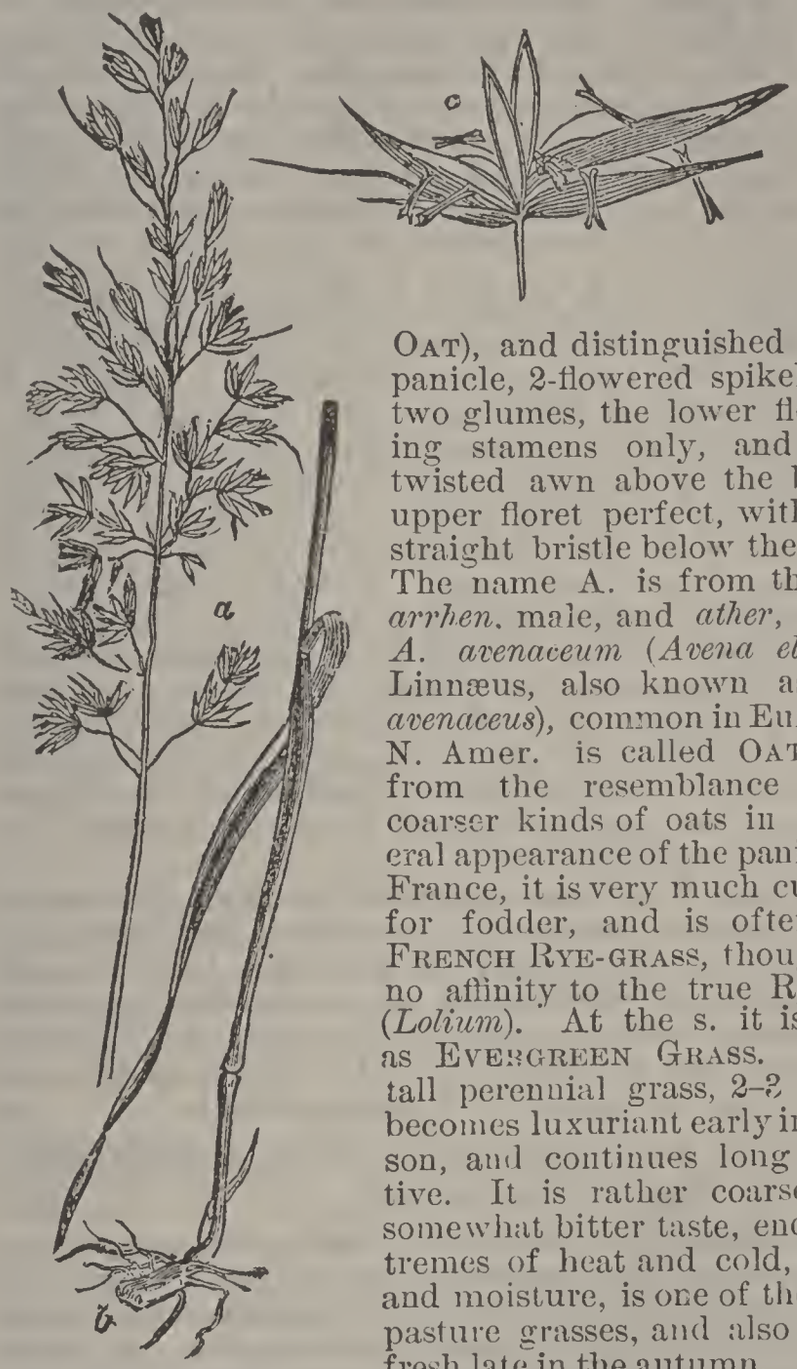
be restrained, and obedience to the law *compelled;* the actual physical seizure or arrest is not essential; it is sufficient if the party be within the power of the officer, and submit to the arrest. Legal provisions concerning A. vary in details in the different states; but generally are as follows: The A. is made by the properly designated authority; usually by the sheriff or one of his deputies; or, in the case of a process of the U. S. courts, by a marshal. Persons not liable to arrest are—*administrators* in suits on the intestate's premises; *ambassadors* and their servants; *attorneys-at-law; barristers* attending court, or on circuit; *bail* attending court as such; *bankrupts*, under certain circumstances; *clergymen*, while engaged in the performance of divine service; *electors* attending a public election; *executors* sued on the testator's liability; *heirs* sued as such; *members* of congress and the state legislatures, while attending the respective assemblies to which they belong; etc., etc. In criminal cases an A. can be made by any peace officer, as a justice of the peace, sheriff, coroner, constable, or watchman; and in the instance of a felony committed in the presence of the officer, without a warrant; also, on a reasonable suspicion, or where there are grounds for the belief that a felony is about to be committed, or is in preparation; but without a warrant only in the case of a felony. A private person may, and by law he should, make an A. in case of a felony committed in his presence, or during the commission of a breach of the peace, or upon reasonable suspicion that the person arrested is the felon, if a felony has been committed. But the private person so arresting may be held liable unless he be ready to prove the commission of the felony, or the grounds for suspicion. Any person is liable to A. for crime except ambassadors and their servants. An A. may be made by night as well as by day, and for treason, felony, breach of the peace, or generally for an indictable offense, on Sunday as well as other days; and the officer may break open doors, even of the criminal's own house, even to arrest a person therein not the owner, as may a private person in fresh pursuit, under circumstances which authorize him to make the A. An officer authorized to make the A., whether by warrant or from the circumstances, may use necessary force (but he may not strike except in self-defense); he may kill the felon if he cannot otherwise be taken, and so may a private person in making an A. which he is *enjoined* to make. If a warrant (q. v.) has been issued, the proper person to make the arrest is he to whom it was issued, whether named or described by his office. Any wilful obstruction of a lawful A. is deemed a very aggravated offense.

ARRESTER, LIGHTNING: see ELECTRICAL PROTECTIVE DEVICES.

ARREST OF JUDGMENT: in English legal practice, an expedient; now modified in the United States so that a motion for A. of J. has place when a plaintiff is not entitled to a verdict; or, that without such motion, the court may suspend its decision. The effect

is practically acquittal, though not barring a fresh indict ment. See JUDGMENT.

ARRHENATHERUM, *ăr-rhĕn-ăth'ĕr-ŭm:* genus of Grasses, allied to *Holcus* (see SOFT-GRASS) and *Avena* (see



Arrhenatherum:
a, panicle, reduced; *b*, root and lower part of culm, reduced; *c*, a single spikelet, natural size.

OAT), and distinguished by a lax panicle, 2-flowered spikelets with two glumes, the lower floret having stamens only, and a long twisted awn above the base; the upper floret perfect, with a short straight bristle below the point.—The name A. is from the Greek *arrhen*, male, and *ather*, an awn. *A. avenaceum* (*Avena elatior* of Linnæus, also known as *Holcus avenaceus*), common in Europe and N. Amer. is called OAT-GRASS, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France, it is very much cultivated for fodder, and is often called FRENCH RYE-GRASS, though it has no affinity to the true Rye-Grass (*Lolium*). At the s. it is known as EVERGREEN GRASS. It is a tall perennial grass, 2–3 ft. high, becomes luxuriant early in the season, and continues long productive. It is rather coarse, has a somewhat bitter taste, endures extremes of heat and cold, drought and moisture, is one of the earliest pasture grasses, and also remains fresh late in the autumn. If cured for hay it should be cut early in the season. A variety having a knotted or bulbous base to the stem, instead of a simple fibrous root, called by some botanists *A. bulbosum*, is an inferior grass and a troublesome weed.

ARRIANUS, *ăr-rĭ-ā'nŭs*, FLAVIUS: b. abt. 100, in Nicomedia, Bithynia: a disciple of Epictetus, the Stoic philosopher, whose system he warmly advocated. The learned men of Athens were highly pleased with the earliest prod-

ucts of his pen, and honored him with the freedom of their city. A. had chosen Xenophon as his model of composition, and hence the Athenians called him the young Xenophon. In 124, he was introduced to the emperor Hadrian in Greece, who conferred on him the freedom of the city of Rome. He was appointed prefect of Cappadocia in 136. Under Antoninus Pius, the successor of Hadrian, he was promoted to the consulship. But some four years afterwards, he appears to have retired from public life, and devoted himself to literature in his native place. As the pupil and friend of Epictetus, he edited the Manual of Ethics (*Encheiridion*) left by his master, and wrote the *Lectures of Epictetus*, in eight books, of which only four have been preserved—to be had in Schweighäuser's *Philosophiæ Epicteteæ Monumenta*, vol. iii. (Paris, 1827). He wrote also *The Conversations of Epictetus*, a work which has been lost, except a few fragments. The most important work by A. is the *Anabasis of Alexander*, or *History of the Campaigns of Alexander the Great*, which has come down to us entire, all but a gap in the 12th chapter of the 7th book. This book, our chief authority on the subject of which it treats, is of great value. In close connection with it, A. wrote his *Indian History*, giving an account of the people of India. Other writings by A., his letter to Hadrian on *A Voyage round the Coasts of the Euxine Sea*, and another, *A Voyage round the Coasts of the Red Sea*, are valuable with regard to ancient geography. There is still another work by our author—a Treatise on the Chase (*Kynegeticos*)—in which, as well as in the *Anabasis*, he has imitated Xenophon.

A. was one of the best writers of his day. His works bear the marks of care, honesty, and correctness; and they were numerous, though several have not been handed down to our time. All that we are possessed of appear to have had translations into Latin. His philosophical works have been translated by T. W. Higginson (Boston 1891) and the 'Anabasis' by Chinnock (1893).

ARRIERE, *ăr-rēr'* [Fr.—from L. *ad*, to, towards; *retro*, back]: of an *army*, the rear; arrears.

ARRIERE-BAN, n. *ăr-rēr'băn* [the French, not understanding the old Teutonic term *heri*, an army, have supposed A. to have the word *arrière* in its composition, which is probably an error]: a general proclamation by which the old French kings summoned to their standard, for the purpose of war, their feudatory vassals, with those also who were in a state of vassalage to them; *fig.*, any general summons issued by an authoritative voice. ARRIERE-FEE, or ARRIERE-FIEF, n. a fee or fief depending on one above it. These fees commenced when dukes and counts, rendering their governments hereditary, distributed to their officers parts of the domains, and permitted those officers to gratify the soldiers under them in the same manner. ARRIERE-VASSAL, n. the vassal of a vassal. ARRIERE-VOUS-

SURE, n. [Fr. *voussure*, coving]: in *arch.*, a secondary arch, an arch placed within an opening to form a larger one. Sometimes it has the effect of taking off the bearing upon a wooden lintel.

ARRIS, n. *ăr'ĭs* [OF. *areste:* mid. L. *arista*, the outer angle of a house]: in *joinery* and *masonry*, the line or edge of meeting of two surfaces. ARRIS-FILLET, a. triangular piece of wood used to raise the slates or lead of a roof against the shaft of a chimney or a wall, so as more readily to throw off the rain; used also for forming gutters around skylights. It is sometimes called a *tilting-fillet.* ARRIS-GUTTER, n. a wooden gutter shaped like the letter V.

ARRISH, n. *ăr'ĭsh*, ARRISHES, n. plu. *ăr'ĭsh-ĕz:* the Devonshire name for *eddish*, or the grass on stubble fields, and the like. See EDDISH.

ARRIVE, v. *ăr rīv'* [F. *arriver*, to reach—from It. *arrivare;* mid. L. *adripārĕ*, to come or bring to shore—from L. *ad*, to; *ripam*, shore]. to come to shore; to reach a place; to gain by effort. ARRIV'ING, imp. ARRIVED, pp. *ăr-rīvd'*. ARRIV'AL, n. reaching a place from a distance: the act of coming to.

ARROBA, *ă-rō'bă:* a weight commonly used in Spain, Portugal, Brazil, and the principal Spanish and Portuguese colonies. In the first of these countries, it is equivalent to to the English quarter of a cwt., or 28 lbs.; it is nearly the same in Portugal, etc. In Spain, the A. is also a measure for wine, brandy, etc., and contains four of our quarts.

ARRODE, v. *ă-rōd'* [L. *arrodo*—from *ad*, to; *rodo*, to gnaw]: to gnaw; to nibble. ARROSION, n. *ăr-rō'zhŭn*, act of gnawing, or state of being gnawed.

ARROGATE, v. *ăr'rō-gāt* [L. *arrŏgātus*, claimed as one's own; *ar'rŏgans*, claiming more than one's due—from *ad*, *rogo*, I ask: F. *arroger*, to arrogate]: to claim more than one's due; to assume more than is proper; to prefer a claim in a spirit of pride; to claim undue power. AR'ROGAT'ING, imp. AR'ROGA'TED, pp. AR'ROGANCE, n. *-găns*, or AR'ROGANCY, n. *-găn-sĭ*, or ARROGATION, n. *ăr'rō-gā'shŭn*, or AR'ROGANTNESS, n. the act or quality of taking too much upon one's self; conceitedness; presumption. AR'ROGANT, a. *-gănt*, assuming too much importance; presuming and overbearing; haughty. AR'ROGANTLY, ad. *-lĭ*. ARROGATIVE, a. *ăr'rō-gā'tĭv*, claiming unduly.—SYN. of 'arrogance': presumption; self-conceit; pride; vanity; haughtiness; assumption; lordliness; disdain; conceitedness;—of 'arrogant': overbearing; presumptuous; haughty; assuming; lordly; proud; exorbitant; magisterial;—of 'arrogate': to appropriate; usurp; assume.

ARRONDISSEMENT, n. *ăr-rŏng'dēs-mŏng'* [F.—from *rond*, round—from L. *rotun'dus*, round]: in *France*, a subdistrict or division of a department, or territory, for administrative and judicial purposes. See DEPARTMENT (French).

ARROW, n. *ăr'rō* [AS. *arewe*: W. *aro*, a weapon: Icel. *ør*, an arrow: Sw. *hurra*, to hurl]: a pointed and barbed

weapon of war shot from a bow, not now used in European warfare; a long rod pointed sharply, and barbed. See ARCHERY: BOW AND ARROW. ARROWY, a. *ăr'rō-i.* of or like an arrow. ARROW-HEADED, a. *ăr'rō-hĕd'ĕd,* applied to wedge-like alphabetic figures, very ancient; also called cuneiform. ARROW-SHAPED, a. shaped like an arrow. ARROW-SEED, n. seed shaped like an arrow. ARROW-MAKER, n. a maker of arrows. Arrow-makers were formerly called *fletchers* and *bowyers,* and were deemed persons of importance. ARROW-POISON, poison used by savages to tip their arrows with. That of Central America is curarine. AR'ROW-ROOT', n. a farina or flour, prepared from the roots of the West Indian plants *Maran'ta arundĭnăcĕa* and *M. Indĭca,* ord. *Marantăcèæ* or *Cannăcèæ*—perhaps so called from the Indians having employed the root in the cure of wounds made by poisoned arrows. BROAD ARROW, an anc. symbol of rank and authority; the common British government mark placed on their movable property, in the form of a widely feathered arrow, or simply as the broad barb of an arrow, thus— ↑ ; three wedge-shaped marks diverging from their united points, cut on stones as marks or points, from which measurements are made by the ordnance survey department.

ARROW-GRASS, n. English name of the botanical genus *Triglochin.*

AR'ROWHEAD (*Sagittaria*): genus of plants of the nat. ord. *Alismaceæ,* distinguished by unisexual flowers, having three herbaceous sepals and three colored petals, numerous stamens, and numerous carpels, which are compressed, one-seeded, and on a globose receptacle. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world.—The COMMON A. (*S. variabilis*) of N. Amer. varies much in the shape of the arrow-shaped leaves which rise above the surface of the water. It is one of those plants which have had an undeserved reputation as cures for hydrophobia. The corms (or solid bulbs), dried and powdered, have sometimes been used for food, but have an acrid, unpleasant taste.—The CHINESE A. (*S. Sinensis*) is a native of China, and has long been cultivated in that country and Japan for its eatable corms, which in a fresh state are somewhat acrid, but abound in starch. It has arrow-shaped, acute leaves, and a branched polygonal scape (leafless stem). The United States has 7 species and 14 varieties.

ARROW-HEADED CHARACTERS: see CUNEIFORM.

ARROW-HEADS: see ELF-ARROW-HEADS.

ARROW-ROOT: a variety of starch extracted from the roots of certain plants of tropical countries. It is a fine starchy farina, valued as a delicacy, and as an easily digestible food for children and invalids. It is obtained from the tuberous roots—or, more correctly, the root-stocks (*rhizomes*)—of different species of the genus *Maranta,* belonging to the natural order *Marantaceæ,* and characterized by solitary ovules, a fleshy style curved downwards branching stems, and white flowers. The species chiefly

yielding it is *M. arundinacea*, a native of tropical America, cultivated in the West India Islands, and growing about two ft. high, with ovato-lanceolate, somewhat hairy leaves, clusters of small flowers on 2-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of farina. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with large paper-like scales. They sometimes curve so that the points rise out of the earth, and form new plants. They are dug up when a year old, washed, carefully peeled, and reduced to a milky pulp. Mills for this purpose have been introduced; but in Jamaica the roots are usually reduced by beating in

Arrow-root (*M. arundinacea*):
a, tubers; *b*, leaf and flowers; *c*, stamen and style.

deep wooden mortars; in Bermuda, by means of a wheel rasp. The pulp is then mixed with much water, cleared of fibres by means of a sieve of coarse cloth or hair, and the starch is allowed to settle to the bottom. The water dissolves, and so removes the greater part of the albumen and salts, the starch quickly settling down as an insoluble powder. Successive washings are employed for further purification. The A. is finally dried in the sun or in drying-houses, great care being taken, by means of gauze, to exclude dust and insects. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to A.

with which it is allowed to mix. Great care is taken to preserve the A. from impurities; and the knives used in peeling the roots, and the shovels used in lifting the A., are made of German silver. The West Indian A., most esteemed in the market, is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian A. is not in general so highly valued, perhaps because substitutes for the genuine A. more frequently receive that name. *Maranta arundinacea* is now, however, cultivated to some extent both in in the East Indies and in Africa. *M. Indica*, which was supposed to be distinct from *M. arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. A. is obtained also from *N. Allouyia* and *M. nobilis* in the West Indies, and from *M. ramosissima* in the East.

The amount of fecula or starch present in the roots of the *Maranta* varies according to age, from 8 per cent. in those of the young plant, to 26 per cent. when full grown, at 10 to 12 months old; and the roots then present the following composition in 100 parts:

Starch, fecula, or arrow-root, ...	26
Woody fibre, ...	6
Albumen, ...	1½
Gummy extract, volatile oil, and salts, . .	1
Water, ...	65½

A. is exported in tin cases, barrels, or boxes, carefully closed. It is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly-fallen snow is being made into a snowball. Through the microscope, the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry farina is quite inodorous, but when dissolved in boiling water it has a slight peculiar smell, and swells up into a very perfect jelly. Potato-starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration, many of the particles of which have a truncated extremity, and their surface is irregular or tuberculated. A. is also sometimes adulterated with rice-starch and with the common starch of wheat-flour.

Not less than 800,000 lbs. of A. are annually imported into the British Isles. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling-water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. When most simply prepared, it forms a light meal, which, however, is not very nutritious. See NUTRITION.

A farina somewhat similar to A., and partly known by the distinct name of *Tous-les-mois*, is obtained from some species of the allied genus *Canna* (q. v.). But East India A. is in

part obtained from the tubers of *Curcuma angustifolia*. Other species of *Curcuma* (see TURMERIC), as *C. Zerumbet*, *C. leucorhiza*, and *C. rubescens*, yield a similar farina; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore, this starch is a principal part of the food of the inhabitants. The young tubers of the Galangal (q.v.), (*Alpinia Galanga*), another plant of the same natural order (*Scitamineæ*), are another source of this farina.—A farina somewhat resembling A., and often sold under that name, is obtained from different species of the nat. ord. *Cycadaceæ*, as from the dwarf fleshy trunks of *Zamia tenuis*, *Z. furfuracea*, and *Z. pumila* in the West Indies, and from the large seeds of *Dion edule* in the lowlands of Mexico.—The starch of Cassava, Manihot or Manioc (see MANIOC), is sometimes imported into Europe under the name of Brazilian A. Potato-starch, carefully prepared, is sometimes sold as English A.; and the farina obtained from the roots of the *Arum maculatum* (see ARUM), as Portland A. Otaheite A. is the starch of *Tacca* (q. v.) *pinnatifida*.—All these, as well as Oswego and Chicago corn-starch—the starch of maize or Indian corn—are so nearly allied to true A. as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope.

The name A. is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recently recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that the name is really another form of *Ara*, the Indian name.

ARROYO MOLINOS, *âr-rō'yō mō-lē'nōs:* village in Estremadura, Spain, noted as the scene of Gen. Girard's complete discomfiture by Lord Hill, 1811, Oct. 28. Gen. Girard had been sent out by Soult on a plundering foray with 5,000 men, when he was surprised early in the morning by Lord Hill, who, with two regiments, the 71st and 92d, dashed through the rain upon the enemy, who fled in all directions, leaving behind everything, arms, packs, etc.; 1300 prisoners were taken; the whole artillery, colors, baggage, etc French historians (Thiers, etc.), however, maintain that the battle was 'undecided,' and that their countrymen only retreated in good order, under the pressure of much larger forces.

ARRU ISLANDS, *ăr-rō':* a Dutch possession, of New Guinea, between 5°—7° s. lat., and 134°–135° e. long.; 2,650 sq. m.; pop. 15,000, of whom 400 are Christians, 300 Mohammedans, the remainder heathens. Principal islands are Meykor, Wammer, Udjier, Wokkam, and Babi. Dobo on Wammer is the chief mart. Sago and cocoa-nut palms are plentiful, and some tobacco, rice, sugar-cane, maize, and edible roots, etc. are cultivated. The forests yield timber, and the sea yields fish. The rocks give edible nests.

and the woods shelter wild swine, hares, parrots, pigeons, birds of paradise, etc. Cotton goods, iron and copper-wares, Chinese pottery, beads, knives, rum, and arrack are imported, and bartered for mother-of-pearl, trepang, edible nests, pearls, tortoise-shell, birds of paradise, etc.

ARSACES, *ȧr'sa-sēz*, or *ar-sā'sēz*: name of several Parthian and Armenian kings. The accounts concerning them which have been transmitted to us by the ancient historians are exceedingly vague and contradictory; and modern criticism has found itself unable to reconcile or simplify the confused statements: see Armenia: Parthia.

ARSE, *ȧrs* [AS., *ars, eears*]: the buttocks or hind-part of an animal.

ARSENAL, n. *ȧr'sĕ-năl* [OF. *arsenac;* mid. L. *arsĕna*, a place for fabricating arms and naval stores: Sp. and F. *arsenal;* It. *darsena*, and *arsenale*, a dock-yard—from Arab. *dârsanah*, a place of work]: a great military or naval repository, where munitions of war are to some extent manufactured, but more particularly stored until required for use. Every national dockyard, every magazine, every armory, is to some extent an A.; therefore the meaning of the word is not definite. The United States arsenals, armories, and depots (1903), are: Arsenals: Allegheny, Penn.; Augusta, Ga.; Benicia, Cal.; Columbia, Tenn.; Fort Monroe, Va.; Frankford, Penn.; Indianapolis, Ind.; Kennebec, Me.; New York; Rock Island, Ill.; San Antonio, Tex.; Watertown, Mass.; and Watervliet, N. Y. Armories: National, Springfield, Mass. Depots, ordnance: Cheyenne, Wyo.; Fort Leavenworth, Kan.; Fort Snelling, Minn.; and Vancouver, Wash. Depots, powder: St. Louis, Mo.; Ellis Island, N. Y.; Dover, N. J. In England, Deptford is a storehouse for naval clothing and provisions, and Weedon and the Tower (q.v.) great military repositories; the only establishment vast enough to deserve the the name A. is at Woolwich (q.v.).—In France, the chief arsenals are at Cherbourg, Brest, and Toulon.

ARSENIC, n. *ȧr'sĕ-nĭk* [L. *arsen'ĭcum;* Gr. *arsen'ĭkon*, arsenic—from Gr. *arsen'ĭkos*, masculine, male—so named from its superior strength]: a semi-metallic element; a poisonous mineral substance, in the form of a white or steel-gray powder, also called ARSEN'IOUS ACID, *-ĭ-ŭs*. ARSENIOUS, a. pertaining to. ARSEN'IC, a., or ARSENICAL, a. *ȧr-sĕn'ĭ-kăl*, containing arsenic. ARSENICATE, v. *ȧr-sĕn'ĭ-kāt*, to combine with arsenic. ARSEN'ICA'TING, imp. ARSEN'ICA'TED, pp. ARSENIATE, n. *ȧr-sĕn'ĭ-āt*, or ARSENATE, n. *ȧr'sĕn-āt*, a salt of arsenic acid. ARSENITE, n. *ȧr'sĕ-nīt'*, a salt of arsenious acid. ARSINE, n. *ȧr'sĭn*, in *chem.*, a body constituted on the plan of a compound ammonia in which the nitrogen is replaced by hydrogen. ARSENIDE, n. *ȧr'sĕn-īd*, or ARSENIURET, n. *ȧr'se-nī'ū-rĕt*, arsenic in combination with a metal. ARSENIURETTED, a. combined with arsenic. ARSENOUS, a. *ȧr'sĕn-ŭs*, pertaining to arsenic, or having it as one of its constituents.

ARSENIC: popular name for arsenious acid (q. v.), but properly restricted to the metal, symbol As, at. wt. 75.0. This is rarely found free in nature, but in combination it occurs largely. See ARSENICAL MINERALS. The metal is generally prepared from Arsenious Acid As_2O_3, by mixing it with its own weight of charcoal, placing the mixture in a well-covered crucible, and subjecting the whole to heat, when the metal set free by the charcoal rises, and condenses in the upper part or cover of the crucible. Metallic A. is very brittle, can easily be reduced to powder by hammering, or even pounding in a mortar; and when a freshly cut surface is examined, it presents a brilliant dark steel-gray lustre, which, however, readily tarnishes on exposure to the air. The metal, as such, is not considered poisonous, but when introduced into the animal system it is there faintly acted upon by the juices, and in part dissolved, at the same time, exhibiting poisonous properties. When heated in the open air, it burns with a peculiar bluish flame, and emits a characteristic alliaceous odor. The only use to which the metal A. is applied in the arts is in the manufacture of leaden shot of the various sizes, when its presence in small quantity in the lead renders the latter much more brittle than it ordinarily is. Several allotropic forms of the metal are known. Of all the compounds of A. the most important is the one already alluded to, Arsenious Acid, an oxide of A. With sulphur, A. forms two important compounds: *Realgar*, As_2S_2, a red, transparent, and brittle substance, which is employed in the manufacture of the signal-light called *White Indian Fire;* and *Orpinent* As_2S_3, or *King's Yellow*, a cheap pigment of a yellow color. With hydrogen, A. forms arseniuretted hydrogen, arsine, AsH_3, a very poisonous gas, and one which has been fatal to several chemists. A. belongs to the nitrogen group of elements. See CHEMISTRY. Its compounds are described under ARSENIOUS OXIDE.

ARSEN'ICAL MINERALS: chiefly in primitive rocks, frequently associated with other metalliferous minerals.—*Native Arsenic*, although nowhere very abundant, is not unfrequently found in mines in Europe, Asia, and America, usually with sulphur and metallic sulphurets. In Britain, it occurs at Tyndrum in Perthshire, It has usually a fine granular character. It is seldom, if ever, quite pure, usually containing a little antimony and iron, and frequently a very little silver or gold.—A very similar and still rarer mineral, found in similar situations, is known as *Arsenic-antimony*, and consists of about two parts of metallic arsenic, and one of metallic antimony. *Arsenic-silver*, or *Arsenical Silver*, is another very rare mineral, consisting chiefly of arsenic and iron, but containing also about 13 per cent. of silver and a little antimony. *Arsenic glance*, found at Marienberg in Saxony, and containing about 3 per cent. of bismuth or less, is thought to be an allotropic form of arsenic. *Realgar* (q. v) is a monosulphide, with 70 per cent. of arsenic (As). *Orpiment* (q. v.) is a trisulphide, with 61 per cent. As. They occur together in the Norris Geyser

basin, Yellowstone Park, and in seams in clay under lava, Iron co., Utah. *Dimorphite* (As_4S_3?) is found at a fumarole near Naples. *Domeykite* is a copper arsenide, As 28.3, found at L. Superior. *Niccolite* is a nickel arsenide, As 56.1; it occurs at Franklin Furnace, N. J., Silver Cliff, Colo., and with *Smaltite* (a cobalt diarsenide, As 71.8) in gneiss at Chatham, Conn. *Gersdorffite*, incrusted on galena and sphalerite at Phœnixville, Penn., is a sulpharsenide of nickel, nearly half As. *Löllingite*, or Arsenosiderite, is an iron-diarsenide, and *Arseniosiderite* (q. v.) is another thing—an arsenic pentoxide compound with iron, lime, and water. *Arsenopyrite* or Mispickel is a sulpharsenide of iron, sometimes cobaltiferous (*Danite*), sometimes nickeliferous; it is nearly half As. *Safflorite* is, like Smaltite, a cobalt diarsenide, As 79.3; and *Rammels bergite* is similar, with nickel instead of cobalt. A cobalt arsenide, nearly four-fifths As, is named *Skutterudite*. There are also tellurium and manganese arsenides described, and *Sartorite* is a lead and arsenic compound with sulphur, while *Epigenite* is a sulphide of this with copper and iron. *Arsenolite*, an As trioxide, has 75.8 per cent. of this element; and another, differing in crystallization, is *Claudetite*. Some lead phosphate (*Pyromorphite*) contains As, and *Haidingerite* is lime arsenate; other arsenates are that of manganese, *Allacite;* a more complex one, *Arseniopleite;* and a hydrous ferric one, *Scorodite*. Still other minerals that contain arsenic are *Ecdemite*, *Trippkeite*, *Pitticite*, *Beudanite*, *Atelestite*, etc. Commercial arsenic is derived from ores worked also for nickel, cobalt, sulphur, lead, silver, etc. in which it is often present in small quantity.

ARSEN'ICAL SOAP: important preparation in Taxidermy (q. v.). Its use is not necessary for the thin skins of the smaller birds and smallest mammals, arsenic in dry powder being sufficient; but for thicker skins it is thought to have more penetrating quality.

ARSENIOSIDERITE, *ȧr-sĕn-ĭ-ō-sĭd'ėr-īt* [Gr. *arsen'ĭkon*, arsenic; *sidēros*, iron]: fibrous mineral found in France and Saxony, the large silky fibres radiating in concretions, like cacoxenite, which it resembles also in yellowish color; its composition answers to arsenic pentoxide, with iron and lime. *Arsenosiderite* differs slightly in spelling from Arseniosiderite, but much in composition ($FeAs_2$): it is now named *Löllingite;* and is the same as Arsenocrocite. It varies from silver white to steel gray, and has varieties such as *Leucopyrite* (Fe_3As_4) and others with a little sulphur or cobalt.

ARSENIOUS OXIDE, often called incorrectly ARSENIOUS ACID: the arsenical compound most familiarly known, popularly called Arsenic. It is obtained principally during the roasting of the arsenical nickel ores in Germany in furnaces communicating with flues. When the arsenic of the ore burns, it passes into the condition of A. O. (As_2O_3), and rising as vapor into the somewhat cool flue, is there deposited as a grayish powder, known by

the names of *Smelting-house Smoke, Flowers of Arsenic, Poison-flour,* or *Rough A.O.* In this condition the A. O. is contaminated with some impurities, from which it may be separated by introducing the gray powder into an egg-shaped vessel, and applying heat at the lower end when the A. O. rises in vapor and condenses in the cool end as a transparent glassy or vitreous substance. Ordinary A. O. of the shops (which is what is popularly known as *arsenic*) is a white crystalline powder, which feels decidedly gritty, like fine sand, when placed between the teeth, and has no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in water to the extent of 1 part of A. O. in about 100 parts of cold water, and 1 part of A. O. in about 10 parts of boiling water. As ordinarily sold in quantities under 10 lbs. in weight, the A. O. is required by the law of some countries to be colored with $\frac{1}{8\frac{1}{2}}$ of its weight of indigo, or $\frac{1}{16}$ of its weight of soot, the object of the admixture being to render any liquid to which the A. O. might be added, with a murderous intent, of a black or bluish-black hue, and thus indicate the presence of something unusual. In packages of 10 lbs. and upwards, A. O. is allowed to be sold in the pure white crystalline form without coloration. When placed in a spoon or other vessel, and heated, the A. O. volatilizes, and condenses in crystals on any cool vessel held above. By this means it can be distinguished from ordinary flour, which, when heated, would char, and leave a coal behind; and from chalk, stucco, baking-soda, tooth-powder, and other white substances, which, when heated, remain in the vessel as a non-volatile white residue. Again, when A. O. is placed on a red-hot cinder, and the escaping vapors cautiously brought under the nostrils, the strong alliaceous odor characteristic of arsenic is given off. The mode in which A. O. comports itself when thrown upon water is likewise peculiar. Instead of at once descending through the water like sand, the A. O., notwithstanding it great density (sp. gr. 3.70), partially floats on the surface, as wheat-flour does; and that portion which sinks in the water rolls itself into little round pellets, which are wetted only on the outside, and contain much dry A. O. within. The solution of A. O. in water is recognized by three tests:

1. Hydrogen sulphide and hydrochloric acid produce a *yellow precipitate* of arsenious sulphide, As_2S_3, which is soluble in ammonia.

2. Ammoniosulphate of copper, an *apple-green percipitate* of arsenite of copper, $CuHAsO_3$. (*Scheele's Green*) sometimes used as a pigment and frequently in a more or less impure condition as a spray for the destruction of fungi on plants.

3. Ammonionitrate of silver, a *yellow precipitate* of arsenite of silver, Ag_3AsO_3.

In many cases A. O. is used as a means of destroying animal life, but, happily, the processes for the detection

of the poison in organic mixtures and in the animal tissues are so unerring, that it is hardly within the range of possibility that an animal can be destroyed by the administration of A. O. without very decided evidence of the existence of the poison being obtained on examination of the various parts of the animal structure; indeed, it may be safely said that there is no limit to the detection of the poison, as even after the animal structure has been so far decomposed that little remains, yet still the poison, from its indestructibility, survives, and will indicate itself clearly on the application of the several tests.

For the isolation and recognition of A. O. in organic mixtures, such as the contents of a stomach, several processes are in use. They depend essentially on separating the A. O. from the organic matter, either by oxidizing the latter, or by dissolving out the former. Their employment demands very great care and considerable skill, especially when the A. O. is only present in small quantity. One of the chief difficulties to be overcome is the presence of small quantities of A. O. in the chemicals and vessels used. A. O. is always found in coal and often in ores containing sulphur. Thence it passes into sulphuric acid and from it to the numerous chemicals in the manufacture of which the acid is employed. An example will make this clearer. A few years ago in Manchester (England) many persons were found to be suffering from arsenical poisoning. Its source was finally traced to beer from a particular brewery. In part this beer was made from sugar, prepared from starch by means of sulphuric acid, which contained arsenic derived from the iron sulphide used in its manufacture.

With certain strong acids A. O. forms salts, such as the chloride, $AsCl_3$. With strong bases, arsenites, like silver arsenite, Ag_3AsO_3, are formed. A potassium arsenite is contained in 'Fowler's solution.' *Arsenic anhydride*, As_2O_5, gives rise to *arsenic acid*, H_3AsO_3, the salts of which closely resemble the phosphates. Compounds of arsenic are largely used in medicine. They are very destructive to the lower forms of life and are, therefore, employed in making 'sheep dip' and for preserving animal matter from the attacks of moths, etc. (See ARSENICAL SOAP.) Arsenic compounds are often used by undertakers in embalming, they enter into the composition of many pigments and A. O. is used in glassmaking, also in the preparation of a number of organic compounds. For this reason certain artificial dyes contain arsenic which has failed to be removed during the process of purification. Occasionally wall paper is colored with an arsenical pigment. This easily rubs off and the finely divided dust is inhaled by the people in the room. The results, in some instances, have been highly dangerous. Candles used for Christmas trees and also the colored figures on ornamental cakes have been found to contain A. O. derivaties. Of course the A. O. is sent into the air as the candle burns and some of the fumes are inhaled by those present. The use of

these colors, for the purposes mentioned, is quite unnecessary and should be prevented by prosecution. A. O. exists in several allotropic modifications.

Arsenic (Arsenious Acid), *Properties of, as a Drug.*—A. has long been used as a medicine. When taken into the stomach, it is soon absorbed into the blood, and circulates with that fluid, exhibiting great power over certain diseases, especially skin diseases, as psoriasis, lepra, eczema (q. v.), etc. It is classed among the tonic minerals, and given for nervous disorders, especially those that are periodic. Of late it has been much recommended for rheumatism; and Dr. Begbie, of Edinburgh, considered that among the remedies for chorea (St. Vitus' dance) it holds the foremost place. In ague, also, and remittent fever, as well as in other disorders originating from the same source, A. and quinine are chief remedies. They are considered to act as alteratives of the blood. The usual method of administering A. is in small doses (from three to five drops) of the liquor arsenicalis, largely diluted with water, twice or thrice in the day. Arsenic is sometimes given combined with iodine and mercury (Donovan's solution).

When given in the doses above mentioned, for eight or ten days, symptoms of poisoning begin to appear; the skin becomes hot, the pulse quick, the eyelids hot and itchy; the tongue has a silvery appearance; the throat is dry and sore, the gums swollen and tender; and if the treatment is persisted in, salivation ensues, and then come nausea, vomiting, diarrhea, nervous depression, and faintness. Death from a poisonous dose of A. may occur in a few hours, or after the lapse of days.

A. has been used frequently as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. Fortunately, in most cases its detection is easy. Orfila found A. in the soil of cemeteries, a fact which has created some discussion among toxicologists. A. is used by anatomists as an antiseptic, but is dangerous, as it is apt to get into cuts on the hands, and under the finger-nails, and cause disagreeable symptoms. In Syria, A. is taken by the peasant girls to increase their personal attractions; and it has been ascertained that in other Austrian provinces, A.-eating is largely practiced by men, who nevertheless attain old age—an instance of the tolerance which can gradually be set up against dangerous poison. These ignorant A.-eaters, who generally begin the use of the drug secretly, claim that it improves the complexion, and so strengthens the respiratory organs as to enable bearers of heavy burdens to climb mountains with ease. When the habit is established it cannot be given up; and sudden cessation causes death.

No effective chemical *antidote* for A. has yet been discovered. In case of an overdose or of intentional poisoning, the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, chalk and

water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron; take a tepid bath, and use narcotics. If the fatal symptoms be averted let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

ARSENOCROCITE: see ARSENIOSIDERITE.

ARSINOE, *ar-sĭn′ō-ē:* b. abt. B. C. 316: daughter of Ptolemy I., king of Egypt, and of Berenice. She was married in her sixteenth year to the aged Lysimachus, king of Thrace, whose eldest son, Agathocles, had already wedded Lysandra, the half-sister of A. Desirous of securing the throne for her own children, A. prevailed on her husband to put Agathocles to death; the consequences of which crime, however, were fatal to the Thracian monarch; for Lysandra, having fled with her children to Seleucus in Asia, managed to induce him to declare war against her unnatural father-in-law. Lysimachus was slain, and Seleucus seized the kingdom. A. now sought refuge in Macedonia, which, however, was also taken possession of by Seleucus; but on the assassination of the latter, after a few months, by Ptolemy Ceraunus, the half-brother of A., she received a hypocritical offer of marriage from Ptolemy, who wanted to destroy her two sons, lest they should prove formidable rivals to his ambition. She consented to the union, and opened the gates of the town in which she had taken refuge, but her children were butchered before her eyes. She then fled to Egypt (B. C. 279), where she married her own brother, Ptolemy II. Philadelphus.

ARSIS, n. *âr′sis* [Gr. *arsis*, the rise of the voice in a syllable—from *airo*, I rise]: in *poetry*, the accented syllable of a foot, or that on which the stress of the voice is put, the other part of the foot being called the *thesis;* in *music*, applied to the rising and falling of the hand in beating time. It is also applied to the elevation and depression of the voice in speaking.

ARSON, n. *âr′sŏn* [F. *arson;* mid. L. *arsĭōnem*, a burning—from L. *arsus*, burnt]: the crime of wilfully setting property on fire. A. (called in Scotland *wilful fire raising*), is, according to the laws of all civilized countries, a crime of the deepest atrocity; for it involves not only destruction of property, but also destruction of, or at least indifference to, the life of others. In the criminal law it is a felony, and has been described in England and some states of the Union as the malicious and wilful burning of the house or building of another man: in some of the states (New York, etc), it is the setting on fire of any building—even one's own house—which contains a human being, or of any outbuilding whose burning will manifestly endanger such a building. To constitute such felony, there must be an *actual* burning—some wasting of fibre by combustion; for intent, however clear, would not suffice at common law to support a charge of A. The extinguishment of the fire does not bar the charge. Some states declare it to be A to set fire with intent to defraud an insurance company.

ART, n. *ârt* [F. *art*, art—from L. *artem*, an art]: the rules and method of doing a thing well; anything done by human skill—the opposite of *nature;* knowledge applied to the uses of every day life—the opposite of *science;* a trade; skill; cunning. ARTS, n. plu. a mediæval term used to designate certain articles or subjects of study; a modern art course is 'Latin, Greek, mathematics, moral philosophy, logic, rhetoric, and natural history;' but the subjects vary in different universities. ART AND PART, a share in contrivance and execution. ARTFUL, a. *ârt'fool*, cunning; crafty. ART'FULLY, ad. *-lĭ*, with art or cunning; skilfully. ART'LESS, a. unskilful; natural; simple. ART'LESSLY, ad. *-lĭ*. ART'LESSNESS, n. AR'TFULNESS, n. skill; cunning. ARTIFICE, n. *âr-tĭ-fĭs* [F. *artifice*—from L. *facĭō*, I make]: a trick; an ingenious contrivance, in a good or bad sense. ARTIFICER, n. *âr-tĭf'ĭ-sẽr*, a workman; a contriver. ARTIFICIAL, a. *âr'tĭ-fĭsh'ăl*, made by art; not produced by nature; feigned; fictitious. AR'TIFI'CIALLY, ad, *-lĭ*. AR'TIFI'CIALNESS, n. the quality of being artificial. ARTIFICIALITY, n. *âr'tĭ-fĭsh'ĭ-ăl'ĭ-tĭ*, appearance or result of art. ART' UNION, *-ūn'yŭn*, a subscription lottery of paintings, engravings, etc. ARTISAN, n. *âr'tĭ-zăn* [F. *artisan*]: a workman; a mechanic. FINE ARTS, *fīn'ârts*, those productions of human skill and genius more immediately addressed to the taste, or to the imagination—such as painting, sculpture, engraving, music, etc. MASTER OF ARTS, in *mediæval times*, one declared qualified to teach students in arts, as *Doctor* was one declared qualified to teach students in theology or in law. DEGREES IN ARTS, academic titles conferred on persons after a certain university course of study, and a strict examination in the subjects of that course, the lower degree being Bachelor of Arts [B.A. or A.B.], and the higher, Master of Arts [M.A. or A.M.].—SYN. of 'art'; knowledge; learning; erudition; literature; science; skill; readiness; adroitness; dexterity; trade; business; profession; contrivance; calling; artifice; cunning; deceit; tact;—of 'artful': cunning; deceitful; adroit; crafty; dexterous; skilful; designing; artificial; fictitious;—of 'artificer': artisan; artist; mechanic;—of 'artifice'; trick; finesse; stratagem; subterfuge;—of 'artless': unaffected; sincere; candid; guileless; frank; open; simple; undesigning.

ART, in the sense of FINE ART: a production (or the science or practice of such production) of human skill or genius more immediately addressed to the taste or imagination; distinguished from the useful arts, or the industrial operations for supplying the common necessities of life. Painting and Poetry are fine arts; Agriculture, Navigation, and Medicine are useful arts.

Sublimity, Beauty, Grace, Harmony, Melody, Pathos, Ideality, Picturesqueness, Proportion, Order, Fitness, Keeping, and the Ludicrous—though they do not all relate to the so-called *beautiful*, are all involved in the matter now under consideration; and it is obvious that no one fact can run through this variety of designations. There

must be a great multitude of agents operating to produce these different impressions, which are related to one another only by attaching in common to the æsthetic class of compositions. Doubtless, several of these names may be employed to mean the same thing, being, in fact, partially synonymous terms; as Beauty and Grace—Proportion, Fitness, and Keeping; but hardly any two terms are synonymous throughout, and there are distinct conceptions implied in Sublimity, Beauty, Picturesqueness, Fitness, and the Ludicrous.

Among the elementary sensations and emotions of the human mind, a certain number may enter at once into the composition of A.; such are sound and sight, the emotion of surprise, and plot-interest. Others may enter by ideal presentation; as the gratifications of the remaining senses, and the emotions of fear, tenderness, irascibility, power. The feelings more specific to A. are those produced by Harmony under its various aspects. When sounds are harmoniously combined, we have the musical art; the painter has a similar aim in reference to colors and forms; and so through all the Fine Arts this quality is found recurring as the crowning work of the artistic hand. Nothing is so indisputably included within the circle of the æsthetical as finely struck harmonies, melodies, or concords. Whatever else may be included in a composition, it is the admission of these that gives the specific charm, although it would be a mistake to dispense with other elements of interest common to art and to every-day life. Story is essential to Romance and Poetry; sweetness in the separate sounds is requisite for good Music; and color in itself imparts æsthetic pleasure apart from harmonious union.

The agreeable effect designated by Fitness takes rank with the artistic pleasures; we may call it the æsthetic of the useful. When a work is not only done effectually, but done with the appearance of ease, or the total absence of restraint, difficulty, and pain, a delight is experienced quite different from the satisfaction growing out of the end attained. Much of the pleasure of architectural support is referable to this source.

Among the susceptibilities touched by artistic arrangements is the sense of Unity in multitude, arising when a great number of things are brought under a comprehensive design, as when a row of pillars is crowned by a pediment. The use of simple figures—the triangle, circle, square, etc. —for inclosing and arranging a host of individuals, has the tendency to make an easily apprehended whole out of a numerous host of particulars. In all large works abounding in detail, the mind craves some such comprehensive plan, whereby to retain the total, while surveying the parts. A building, an oratorio, a poem, a history, a dissertation, a speech, should have a discernible principle of order throughout, the discernment of which gives an artistic pleasure, even in works of pure utility.

The Fine Arts, individually considered, may be divided into two classes, by drawing a distinction of some impor-

tance as regards the question of an artistic *standard*. One class contains the *effusive* arts, or those which consist of mere outbursts of the inward spontaneity, regulated by the effect of the display on the sense of the beholder or listener. Music is a good example. The spontaneous effusions of the human voice, and those prompted by the various emotions, are corrected and tuned by the ear into melody and harmony, and after this process has been often repeated, pleasing airs and compositions are the result. It is the same with the Dance, considered as a fine art. In like manner, dramatic gesture and display, and the graces of elocution and fine address, are the natural promptings rendered pleasing by being changed and modified for that express end. Contrasted with the purely effusive are the so-called *imitative* arts, or those that involve the representation of some of the appearances of the outer world. Such are Painting, Sculpture, and Poetry. In these, the artist is trammelled with a new condition—namely, a certain amount of fidelity to his original. In the others, there are no originals, other than those whose existence is only that of natural ideals of harmony in the mind. The musician is bound by the sole condition of gratifying the ear; but a painter chooses his subject from nature, and although he must contrive to yield the pleasures of color, outline, and grouping, he must do so with a certain respect to the object copied. The poet, in depicting the life of men, comes under the rule of fidelity to this extent, that an obvious misrepresentation is apt to give a painful shock, and mar the pleasure that would otherwise be derived from the poetry itself. It is not so much that truth is a part of the artist's pleasure,as that falsehood is a stumbling-block in the way; for even the imitative arts are so only in part. There is no imitation in the metre and cadence of a song, yet these often constitute its main charm. So a certain license of fantastic effusion is allowed to poets, subject to no rules but the making of an impression on the feelings. The creation of imaginary worlds, when avowed, is not objected to; and the criterion of fidelity to the actual is accordingly laid aside for the time The various arts of Decoration and Design are for the most part effusive, although occasionally imitative. Architecture is not in any way imitative; the coincidence between the gothic roof and the intermingling foliage of a double row of trees is mere accident.

These observations are necessary in order to qualify the current maxim, that Nature (as known in actual operation) is the artist's standard, and Truth (as developed in facts) his chief end; conditions that, in their strictness, apply only to science, and to science in its more outward domain as physical. It is the scientific man that should never deviate from nature, and should care for truth above every other consideration. The artist's standard is *feeling*, his end the refined ideal; he may go to nature, as known in operation, but it is to select what chimes in with his feelings of artistic effect, and pass by the rest. He is not

bound to adhere to what nature shows him even in her choicest displays; his own taste being the touchstone, he alters the originals at his will: he has right to claim knowledge of a higher 'nature' than is yet visible to him. The student of physical science, on the other hand, must embrace every fact with open arms. If a nauseous fungus or loathsome reptile meet the eye of a naturalist, he is bound to record it as faithfully and minutely as he would dilate on the violet or the nightingale. When a painter adopts the human figure as a basis for setting forth harmonies of color, beauties, and form, and picturesqueness of grouping, he ought not to jar the universal sense of consistency by a wide departure from the usual proportions of humanity. Still, the observers do not look for anatomical exactness; they know that the studies of an artist do not imply the knowledge of a professor of anatomy; but they expect the main features of the reality to be adhered to. In like manner, a poet is not great because he exhibits human nature with literal fidelity to its actual development in operation; to do that makes the reputation of a historian or mental philosopher. The poet works by his metres, his cadences, his touching similes, his graceful narrative, and his exaltation of reality into the region of ideality, and if in all this he avoids serious mistakes and gross exaggerations, he succeeds in his real vocation, which is to give glimpses of a possible nature of a grade higher than has yet been reached in the actual. It is imperative, however, that he keep his grand ideal within limits where it can be identified as still one with the natural.

The attempt to reconcile the artistic with the true (or actual)—art with nature as known—has given birth to a peculiar school, in whose productions a restraint is put upon the flights of pure imagination, and which claims the merit of informing the mind as to the realities of the world, while gratifying the various emotions of taste. Instead of the tales of Fairyland, the Arabian Nights, and the Romances of Chivalry, we have the modern novelist, with his pictures of living men and manners. In painting, we have natural scenery, buildings, men, and animals represented with scrupulous exactness. The sculptor and the painter exercise the vocation of producing portraits that shall hand down to future ages the precise lineaments of the men and women of their generation; hence, the study of nature has become an element in artistic education; and the artist often speaks as if the exhibition of facts were his leading purpose. It is probably this endeavor to subject the imagination more strictly to the conditions of visible reality, that has caused the singular inversion whereby the definition of science is made the definition of art.

But while fidelity, in the imitative class of arts, is to be looked upon, in the first instance, as avoiding a stumbling-block rather than constituting a charm, there are still certain ways wherein we derive from it a sort of pleasure that may be called æsthetic. We feel drawn by fellow-

feeling towards one who has attended to the same objects as ourselves, or who has seized and put into vivid prominence what we have felt, without ever having expressed. The coincidence of mind with mind is always productive of the agreeable effect of mutual sympathy, and, in some circumstances, there is an additional effect of pleasing surprise. Thus, when an artist not merely produces in his picture those features of the original that strike every one, but includes all the minuter objects that escape the notice of the generality, we sympathize with his attention, we admire his powers of observation, and become, as it were, his pupils, in extending our study and knowledge of nature and life. We feel a pungent surprise at discovering, for the first time, what has been long before our eyes; and so the minute school of artists labor at this species of effects. Moreover, we are brought forward as judges of the execution of a distinct purpose; we have to see whether he that is bent on imitation does his work well or ill; and if our verdict is favorable, our admiration is excited accordingly. There is, too, a certain exciting effect in the reproduction of some appearance in a foreign material, as when a plain surface is made to yield the impression of solid effect, and canvas or stone imitates living humanity. Finally, the sentiment of reality, as opposed to fiction or falsehood, appealing to our practical urgencies, disposes us to assign a value to every work in which reality is strongly aimed at, and to derive an additional satisfaction when fidelity of rendering is induced upon the charms peculiar to A. Thus imitation—which, properly speaking, is a mere accident attaching to Sculpture, Painting, and Poetry, and has no place in Music or Architecture—may become the centre of a small group of agreeable or acceptable effects. These effects are the more prized, because we have been surfeited with the purely æsthetic ideals. We turn refreshed from the middle-age romance to the graphic novel of our own time.

Besides being a source of pleasure, art is frequently spoken of as having an elevating and refining influence on the mind and character; for which reason it is considered a proper object of public encouragement in civilized communities. The elevating influence is owing to the higher nature of artistic pleasure as above described, the taste for which helps to rescue mankind from the exclusive dominion of sensual and selfish enjoyments. This beneficent influence has not been realized when art has been degraded to the service of the sensual.

In striving to discriminate between ART and FINE ART it may be suggested that those useful arts based on purely scientific deductions may so excite love as to quicken the imagination and excite the spiritual senses, thus approaching Fine Arts. The beggar whose profession induces the exercise of spiritual faculties, so that he becomes an actor, is a student of Fine Art, because the exercise of the spiritual faculties in the pursuit of any art makes it at once a Fine Art. The degree in which it is Fine Art can not be meas-

ured with absolute exactness; it being by examples that we can approach to an understanding of it. In the middle ages there were men (mostly monks) who learned to paint little pictures on the pages of missals. These painters were taught by their elder brethren to use colors and shapes by formulas, eyes, fingers and garments painted, not like nature's forms and colors, but by a fixed formula, as mechanical as the making of horseshoes,—as mechanically taught as was their writing. We carelessly call this Fine Art because it was picture making. When one of these artisans had good taste, exceptional color sense or a feeling for refined line, when he *loved* his work so sincerely that it awakened his spirituality, he made true Fine Art, and only then. Fra Angelico was more spiritual than his predecessors;—though taught in exactly the same way and working by the same formula, he was an artisan with superior spirituality, so much so that he is correctly rated as a wonderful producer of Fine Art.

Little by little, more learning crept into the mechanics of painting with the coming of the renaissance; though it still was taught by rigid formulas. We can verify the time and place of the making of some unknown picture by observing the formula used in brushing in a finger nail,—the formula taught the painter. So the art of painting progressed, but always taught by specific formulas, until the coming of Raphael shows us a man with remarkable spirituality, which triumphed over his teaching, though that was a matter of formulas as with all the rest. He introduced in his paintings an individual spirituality so marked that experts can pick out his pictures from a mass of others, all painted alike technically, with remarkable certainty. Michael Angelo's statues are so like those of ancient Greece and Rome as to be easily mistaken for the latter were it not for the sense of power, of intensity of expression which came of Angelo's marvelous spirituality, a different spirituality from any other in the world. Hundreds have made statues by the formulas of Angelo, and each one claimed to be a maker of Fine Art;—but was he?

As has been suggested, intense love of art work may excite spirituality. There was a poor mason's son, named Caravaggio, born in Italy in 1596 in the mountains, who watched the fresco painters striking paint into the fresh mortar on the wall. All he knew of formulas was caught at these hasty observations, but his love was excited. His mechanical inclination was remarkable and his invention unusual. The love was spiritual, the formulas he himself invented were mechanical; the result Fine Art, strangely original, brutal, forceful, like nature, but crude and nearly repulsive. But he loved his art intensely. Many a sign painter has been equally forceful but had not this love which excited the spiritual sense in the uncouth mountain boy. He left his influence to form a lineage through like minded men—the Spaniard, Ribera, his fellow countryman Zurbaran, and even to the man of

greater refinement and nobler spirituality, the great Velasquez. There were many others of the same school, mechanically strong, spiritually lacking. They were scarcely Fine Art makers;—though kindly Time has cast a glamor and a mystery over their canvases which makes them attractive as mechanical work.

There was a man who could perceive the forms of nature more keenly than others and who was so wonderful an artisan as to surpass all competitors. His name was Meissonier. Was he a maker of Fine Art? Undoubtedly the majority of connoisseurs would answer "yes," though there is a party of the opposition, to whom attention must be given, denying his spirituality. He painted small pictures with minute details;—usually men, soldiers and horses, with the accompanying array of golden epaulettes and fine equipments, or fine clothes of the period of picturesque styles. The subject matter was interesting, attractive and good historical data. So intense was his study, so wonderful his bold touch—though so minute—that all the world marveled. But no one loved his pictures. The admiration they excited was of the calculating sort.

Another painter has spent his life experimenting scientifically with colors, laying pure, contrasting pigments side by side in little dabs and never blending them to produce smoothness. He has taught the profession many things and produced remarkably brilliant effects of sunlight. Fortunately this man—Claude Monet—has a special measure of spirituality and certainly does produce Fine Art.

This discussion has been confined to the art of painting because pictures are permanently in evidence, witnesses readily cross questioned. The art of the sculptor is less easily subjected to analysis and less understood. Actors have methods which follow closely those of the painter; studying nature and nature's moods, the weather and its influence on mankind, people's moods and their influence on one another, expressions of faces and pose of figures. Neither of these artists can make Art unless he rearranges this naturalistic material according to the rules of picture making and play acting. The actual movements of lovers or haters would impress the public but little if presented literally. These movements must be arranged systematically—according to a formula;—some formula, as there may be many and varied formulas. It is the fact of a necessitated artificiality that is here insisted upon. But to all this science the actor must add spirituality or there will be no Fine Art. It is the same with the musician; he hears sounds, perhaps in nature, perhaps instrumental, which he must reduce to a system of harmonies according to the science of his profession. To make this scientific arrangement with Fine Art he must add spirituality. When Paderewsky plays the piano, he may render a scheme of harmonies with no more accuracy than any other highly trained musician. In actuality he does this and more;—

he adds to his science spirituality as none other can, so carrying his audience to an ecstacy of delight. Of course the musician can reveal his spirituality in composing a harmony as well as in the rendering of one. The same is true of the playwright in composing work for others to act on the stage. This accounts for the success of one and the failure of others;—some are artisans, some artists. The painter may study grace and harmony of line and harmonies or contrasts of color, always with some system in his mind. The sculptor is limited to the requirements of his monumental effect, pays little attention to color and more to line and modeling, learns his formulas and may be a Fine Art worker only when imbued with spirituality; the same applying to the poet in the degree called for by his subject but he also must have science, and spirituality."

In all of these arts the formulas are capable of scientific analysis and can be reduced to a mathematical statement. They can be taught, as formulas. This scientific instruction gives the student in any one of these lines a better command of himself, but it will not make an artist of him. Spirituality alone can do that, something the schools can not teach. The architect is the most scientific of all art workers. One would imagine that any talented person could be taught architecture. So he can, but the success of one architect and the failure of another only proves that spirituality is essential to success in this excessively difficult Fine Art. There is a complication in all arts (excepting possibly architecture) which defies analysis; the literary element. Even music does not escape it. The poet must tell a story, describe a scene, show forth human passions, lead us through a philosophical wilderness or a garden of fancy. The actor is in the same predicament. Sculptor and painter are tormented with the desire to do the same. Sometimes it happens that one of these artists has made such a success on literary lines that he fails in the more essential purely artistic presentation. The first essential in painting is that the artist can paint well by some formula or another; so with the actor and all along the line. One of the maledictions due to all arts is the tendency to neglect fine technical qualities because of the abundant ability to tell well a story. It is for this reason that so many able critics denied to the late Sir Henry Irving the title of 'great'. The spirituality of Irving was less developed on the artistic than on the literary side. Some declare that he had no spirituality at all; that he was but a highly trained artisan and made no Fine Art. Wilkie, who delighted thousands with his 'Blind Man's Buff' and 'The Blind Fiddler' failed utterly when he attempted to be purely an artist without any story to tell.

There are literalists, or naturalists, in all arts, though it is possible that architecture nearly escapes, those who seek to reproduce with exactness what they have ability to see in nature. There are fanciful ideas to be presented,

such as are based less on truth to nature. It matters not how nearly the artist leans to one or to the other tendency; it matters not that he have science, his spirituality will measure his success. Lack of science will make his art uncouth and painfully imperfect, lacking in coherence, but the greater element of character will overcome all, provided it be the ourpouring of a heart filled with love, love which excites spirituality. Love begets love;—love on the part of the artist awakens our love. The untrained artist who has love for his work, may fail to suggest nobility of form, monumental qualities, dignity and grace—as many do—but the world feels the love he had and loves with him. This is true of the painter, sculptor, actor, poet, and musician, even of the architect. Many literalists have this love and we love their work. Many with fanciful ideas or makers of tragedy or romance produce a rude art, but it may be that we love it.

There is a peculiarity of poetry which other arts seem to escape—the balancing symbol which should accompany each thought; the thought and its echo, the statement of an idea and its fanciful counterpart, as: 'the cares which haunt the day shall fold their tents like the Arabs and as silently steal away.' Cares have no tents to dwell in, but they are nomads and may vanish when we are not looking. The architect has little temptation to be a naturalist, though there are gateways which simulate tree trunks and have realistic vines clamboring up their bark. Needless to say, a gateway is a dignified structure, supposed to stand firm, erect and strong, its posts or piers are insulted if any other than material for resisting downfall and maintaining the swinging doors. Of all arts—each scientific—architecture is the most subject to mathematical laws. It might be concluded that architecture could be taught to any clever youth—and many think so. But it is the most difficult art of all. Its failures and successes are difficult to analyse. What is it then which makes one building a lovable object and another a piece of unlovable machine work. Is it not the spirituality of the architect?

In the arts of painting and sculpture the portrait maker holds a high rank; according to some philosophers the highest. In no other art does spirituality play so important a part. Any trained draughtsman, or good modeler in clay, can secure a vraisimilitude of a face, that is, a likeness. But this alone is not good portraiture. The latter comes of the ability to observe the fleeting expression, and to know what forms in the face bring out this expression. Subtleties of expression are always to be found in these evasive movements. The portraitist must be excessively keen—something which can not be taught him—and he must be in such sympathy with his subject as to peer into the depths of his soul—and this can no more be taught him than the other. It is this spirituality which makes Sargent so great and made Velasquez the lofty master of his century; which made the rude, careless and reckless Goya so impressive.

We see it constantly stated that an artist must work to please—and so the actor with his art and the poet and others. As the word 'please' is commonly understood, this is not true. It is said that the presentation of beauty is the aim and end of art; which is also a questionable doctrine. If the artist in any line is powerfully impressed with some scene, moved by some event or devoured by some fancy, some working of the imagination, he being really a born artist is filled with desire to give expression to that which is wringing his heart, being unhappy until he does so. He has got to do it. This expression may be 'pleasing' or it may not be; it is but the outpouring of an over filled soul. It may be 'beautiful' or it may be what most men call 'ugly.' It matters not; it is true Fine Art if the maker have love, the love which excites spirituality. Usually such an artist is utterly indifferent to the opinion of mankind. He is in fierce earnest and his impressiveness carries the day; men end by loving his work—ugly as it may be, unpleasant as they at first found it.

See ÆSTHETICS: also the authors named in that article. See also Bain on the *Emotions and the Will;* Herbert Spencer; Ruskin; Lotze; Schasler. For practical reading by everyday people: John C. VanDyke: *Art for Art's Sake, Studies in Pictures, How to Judge a Picture,* (N. Y., all well illustrated); George Clausen: *Aims and Ideals in Art* (N. Y., illus.), *Six Lectures on Painting* (illus.); Walter Pater: *Appreciations, with an Essay on Style* (N. Y.); Carleton Noyes: *The Gate of Appreciation* (N. Y.), *The Enjoyment of Art.*

ART, HISTORY OF: a portion of the history of civilization. As regards each particular people, the history of their efforts to conceive and express absolute perfection, or what is commonly called ideal beauty, in form and color, is one of the chief tests of the stage of progress which they have attained. Nor is it as an indication of their command over physical nature, of the abundance of their external resources, or even of their intellectual activity alone, that the history of the art of a people is thus important. It exhibits their moral and even, in a certain sense, their religious position, for the inseparable connection between the beautiful and the good is in no way more clearly manifested than in the fact that the first inroads of demoralization and social disorder are invariably indicated by a diminution in the strength and purity of artistic forms. It has been usual to include under the term history of art the history of the arts of form only, including architecture, but excluding poetry and music, though these latter are generally included when we speak of the fine arts. See ART.

The classical nations of antiquity were not insensible to the importance of tracing the development of that rich artistic life which they had originated, and we accordingly find the germs of artistic history in Pliny, Quintilian, Pausanias, and others. In the middle ages, every trace of a general historical treatment of art disappears, though

casual remarks and incidental notices on the subjects of artists and the arts are abundant, particularly in such works as the *Liber Pontificalis* of Abbot Anastasius, commonly known as 'the Librarian,' in consequence of his having filled that office at the Vatican in the 9th century. But a history of art, in the sense which we have here assigned to the term, made its appearance in the world for the first time on the revival of letters, in the 15th and 16th centuries; when the artistic treasures of the heathen world, which had come upon mankind as novelties, were brought into contrast with that peculiar type which art had assumed under Christian influences during the middle ages, on the one hand (see BYZANTINE ART), and on the other with that rich harvest of fresh invention which ripened during the long lives of Leonardo da Vinci (q. v.) and Michael Angelo (q. v.), in the period of which Raphael's (q. v.) short career may be regarded as the noon-day. While Vasari (q. v.) traced the great epochs of Italian art from only a biographical point of view in his celebrated work, the students of classical literature collected such expressions of opinion on artistic subjects as the writings of the ancients contained, and Palladio, Ligorio, Vignola, and others measured ancient buildings and their constituent members. In this way a vast mass of information on artistic subjects was brought together. But though the materials which might have served for a history of art were thus supplied, it was long afterwards that any proper historical treatment arose; and the knowledge of ancient art which had been gained was applied to their respective purposes by artists on the one hand and philologists on the other. As regarded modern art, the biographical method of Vasari was adhered to, and to this circumstance we are indebted for the innumerable artistic anecdotes which have been preserved. The remarkable variations in style which exhibited themselves between the 16th and 18th centuries gave rise to a species of historical treatment which had for its object the discovery of the common features by which the artists of the respective periods were distinguished. But the history of style, strictly speaking, begins with Winckelmann (q. v.), who was the first to divide ancient art into epochs, and to trace its connection with the general history of human progress. It was from this period that the history of art came to be regarded as a branch of the history of civilization. Even where the biographical method continued to be followed, it was henceforth with this difference, that the division into schools took the place of mere chronological arrangement. The strongly classical tendency which exhibited itself towards the end of the last century, and the romantic reaction and consequent admiration for the middle age which succeeded, though both must be regarded as one-sided influences, had an unquestionable effect in calling attention as to what was really great in the artistic productions of these respective periods; and during the present century, the history of art has gradually assumed

a more important place as a department of general history. In only very recent times, however, has a complete artistic history appeared in Kugler's *Handbook of the History of Art,* partially translated into English, and edited by Sir Charles Eastlake. In the original work, which is excellent, the immense mass of material that the subject offered has been arranged in periods, and treated in such a manner as to present a sketch complete in itself, while its connection with and dependence on general history, social, political, and philosophical, are carefully indicated throughout. With Kugler's history, that of Schnaase is to be mentioned—a work giving a philosophical and historical account of the origin of the various styles, and their connection with each other; as also the works of Lübke, Springer, and Carriere. Kinkel's history of Christian art has unhappily remained incomplete. Waagen, Passavant, Reumont are well-known authors. There are many other historical works of importance on special departments and separate schools of art, monographs such as Stirling-Maxwell's *Annals of the Artists of Spain,* and *Velasquez and his Works;* Ruskin's *Modern Painters;* Crowe and Cavalcaselle's *Hist. of Painting in Italy,* and their *Raphael;* Mignaty's *Le Corrège;* Murray's *History of Greek Sculpture.* See PAINTING: SCULPTURE.

ARTA, *âr'tâ:* the name of a gulf, town, and river. The gulf (ancient *Ambracius Sinus*), an arm of the Ionian Sea, between Greece and Albania, is about 20 miles long by 10 miles broad. Near its entrance the battle of Actium was fought. The town, called also Narda (the ancient *Ambracia*), about six miles north of the gulf, stands on the river, which is here about 200 yards wide, and begins to be navigable. It carries on a considerable trade in wine, oranges, and tobacco. Pop. 7,582.

ARTABAZUS, *âr'tă-bā'zŭs:* name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, one commander named A. led the Parthians and Chorasmi. At a later period he warned Mardonius, but in vain, against engaging in battle at Platæa; and on the first indications of defeat, he withdrew his own division, amounting to 40,000 men, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently, he acted as negotiator between the Spartan Pausanias and Xerxes.

Another ARTABAZUS was general under the Persian king, Artaxerxes Mnemon, and revolted against Artaxerxes Ochus B.C. 356. For this offense he appears to have been forgiven; and subsequently we find him accompanying King Darius after the battle of Arbela. Alexander rewarded his fidelity by appointing him satrap of Bactria.

ARTABOTRYS, *âr-tă-bŏ'trĭs* [Gr. *artaō,* to fasten; *botrus,* a cluster of grapes—so called because it possesses

tendrils]: genus of plants belonging to the order *Anonaceæ*. *A. odoratissima*, or Sweet-scented A., is a beautiful Chinese plant, which makes a fine covering for walls.

ARTAGUETTE, *âr-tâ-gĕt′:* d. 1736; b. France: soldier. He accompanied Bienville, the colonial French gov. of La., to America, and was employed in subjugating the Indians. His success in overcoming the great Natchez tribes was rewarded with the command of the Ill. and Wabash regions. When Bienville determined to punish the Chickasaw tribe for joining English traders and interfering with the commercial interests of the French on the Mississippi river, he gave A. command of an expedition consisting of 50 French troops and more than 1,000 friendly Indians. In 1736, June, A. descended the Mississippi river with his Indians, and when within striking distance of the Chickasaw stronghold, established a concealed camp, and awaited the arrival of the troops from New Orleans. For some cause the troops did not appear, and he reluctantly ordered an attack on the Chickasaws, doubting his ability to longer restrain his allies. His Indians captured two strongholds, and in attacking the third A. was twice wounded, and when he fell his followers fled, excepting a Jesuit priest who remained to dress his wounds. After the retreat, the Chickasaws burned A., the priest, and their other prisoners at the stake.

ARTANTHE: see MATICO.

ARTAXA, *âr-tăks′a*, or ARTAXIAS, *âr-tăks′ĭ-as:* name of three kings of Armenia. A. I. was a gen. under Antiochus the Great, and when the latter was defeated by the Romans made himself independent in Armenia and founded the kingdom, B.C. 190. A. II. was chosen king after his father had been dethroned and taken by Mark Antony to Alexandria B.C. 34; was expelled by the Romans; reinstated by Phraates IV. of Parthia; and murdered by his nobles for his cruelty. A. III., whose original name was Zeno, was a son of the king of Pontus, and was placed on the throne by the Romans A.D. 18.

ARTAXATA, *âr-tăks-â′tâ:* strongly fortified city in Upper Armenia, said to have been built by Annibal for King Artaxias. It was burned by Corbulo; rebuilt by Tiridates, who renamed it Neronea, in honor of Nero; and was afterward known as Ardesh.

ARTAXERXES, *âr′tăks-ẽrks′ēz:* the name of several kings. A. I., surnamed *Longimanus*, second son of Xerxes, escaped from the conspiracy of Artaban and others, and ascended the throne B.C. 465. His long reign, extending to 425, was marked by a decline of power.

ARTAXERXES II., surnamed *Mnemon*, succeeded his father, Darius II., B.C. 405. After gaining the victory over his brother Cyrus, he became involved in war with Sparta, which ended with the Antalcidean Treaty of Peace: he d. 361.

ARTAXERXES III. surnamed *Ochus*, son and successor of A. II., reigned in the true style of oriental despotism until B.C. 338. One of his most daring exploits was in

Egypt, where he caused the divine bull Apis to be slaughtered and cooked as ordinary beef. A. III. was poisoned, 338, by his eunuch Bagoas. It is said that his flesh was eaten by cats, and that hilts for scimitars were made of his bones.

The founder of the new Persian dynasty, or the Sassanidæ (which ruled A.D. 226–651), was named Artaxerxes.

ARTEAGA, *ȧr-tā-ȧ'gȧ*, ESTEBAN: d. 1799; b. Madrid: historian. He was educated for a Jesuit priest, and was engaged in missionary and educational work in Spain till the suppression of his order, when he removed to Italy. His best-known publication is a history of the Italian lyrical drama, *Le Rivoluzioni del Teatro Musicale Italiano*, 2 vols. (Bolonga 1783).

ARTEAGA, JOSÉ MARÍA: about 1830–1865, Oct. 21; b. Aguas Calientes, Mexico: soldier. Born of poor parents, he received a common-school education, and was apprenticed to the tailor's trade. About 1850 he was appointed a sergeant in the army, and serving through the various revolutions had attained the rank of gen. at the time of the French invasion. He rendered important service in fighting the French army supporting Maximilian till the battle of Amatlán, where he was captured, after which the French, fearing his military skill, shot him at Uruapán.

ARTEDI, *ȧr-tā'dē*, PETER: 1705, Feb. 22—1735, Sep. 21; b. at Anund, province of Angermannland, Sweden: celebrated naturalist. He was at first designed for the priesthood, and entered the Univ. of Upsala, to pursue the usual course of philosophy and theology, but he soon betook himself to medicine. In 1728, Linnæus went to Upsala to study the same science, and intimacy sprung up between the young men. They worked together, and to a certain extent, on the principle of a division of labor. Physiology, chemistry, and mineralogy they pursued in common; but to this A. added ichthyology, and Linnæus ornithology and entomology. In 1734, A. sailed for England, and Linnæus went to Lapland, each having made the other his heir and executor of all his scientific documents. While in London, A. wrote the preface to his *Ichthyologia*. Next year he went to Leyden in Holland, where he found Linnæus just arrived from the north. Each showed the other the results of his labors. A.'s career was abruptly ended by his falling into one of the canals near Amsterdam.

A.'s only complete work is the *Philosophia Ichthyologica*. The *Synonymologica* is described as a work of extraordinary labor, but somewhat confused. Linnæus faithfully performed his duty as his friend's executor. He arranged, corrected, and completed his manuscripts, and published the whole, together with the life of the author, in 1738. According to Cuvier, the great work of A. is the first named, which gave a truly scientific character to the study of fishes. The only error of any magnitude which occurs in it is including the Cetaceæ among fishes. A. was also a distinguished botanist. He was the first to indicate, as a

special characteristic, the presence or absence of involucra in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus has called a genus of these, in memory of his friend, *Artedia*.

ARTEMIA, *âr-tē'mĭ-ă* [Gr. *Ar'temis*, Diana]: genus of *Entomostracans* belonging to the family *Branchipodidæ*. The *A. salina*, or Brine Shrimp, loves water so salt that most other marine animals die in it. At the salt-pans, at Lymington, Eng., the workmen call them *brine-worms*.

ARTEMIS: see DIANA.

ARTEMISIA, *âr-tē-mĭsh'ĭ-a*: Queen of Caria (reigning B.C. 352–350): wife of Mausolus, and celebrated for the magnificent mausoleum which she caused to be erected to her husband's memory. See MAUSOLEUM.

Another ARTEMISIA, queen of Halicarnassus, accompanied Xerxes in his expedition against Greece, and distinguished herself at the battle of Salamis (B.C. 480); she ended her life in consequence of an unfortunate attachment, by leaping from a rock.

ARTEMISIA, n. *âr'tĕ-mĭzh'ĭ-ă* [*Ar'temis*, one of the names of Diana, who presided over women in child-bed]: genus of plants of the nat. ord. *Compositæ*, sub-order *Tubuliflorœ*, in which the flowers of the disk are hermaphrodite, those of the ray in one row, the bracts forming a roundish imbricated head, the receptacle naked or hairy, the achenia obovate, and destitute of pappus. The heads of flowers are numerous and small; the leaves are generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of temperate regions. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes acrid and bitterish taste.—To this genus belongs WORMWOOD (*A. Absinthium*), the *Apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Britain, the continent of Europe, and the northern parts of Asia and America, growing in waste places, by waysides, etc. It is a perennial, 2 to 4 ft. high; its leaves bipinnatifid and clothed with a silky down, and its small hemispherical drooping heads of flowers are of a dingy yellow color, and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, both of great strength, upon account of which it is used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge. It was formerly in much use as a febrifuge. It is frequent in gardens, occupying an important place in the domestic pharmacopœia, and is an essential ingredient in a number of compound medicines. Its roots, and those of some other species of this genus, have been recommended in epilepsy.—SEA WORMWOOD (*A. maritima*, including a variety which has been called *A. Gallica*), a native of salt-marshes

in Britain and other parts of Europe, has similar properties, and is occasionally used for the same purposes; also ROMAN WORMWOOD (*A. Pontica*), a native of the middle and south of Europe, but not of Britain—TARTARIAN WORMWOOD (*A. Santonica*), a native of Tartary, Persia, and other parts of the East; and INDIAN WORMWOOD (*A. Indica*), a native of the Himalaya, abounding at

Wormwood (*Artemisia Absinthium*).

elevations of 2,000–6,000 ft. Indian wormwood grows to the height of 12 ft. It is considered in India a powerful deobstruent and antispasmodic. TREE WORMWOOD (*A. arborescens*), a native of the s. of Europe and the Levant, is also larger and more shrubby than the common wormwood, which in characters and qualities it much resembles.—The dried flower-buds of a number of species of A. are sold under the names of WORMSEED and of *Semen Contra, Semen Cinæ, Semencine*, etc., and have long been in much repute as an anthelmintic. *A. Santonica*, and *A. Sieberi* (or *A. Contra*), a native of Palestine, are believed to yield much of the wormseed which is brought from the Levant, also *A. Judaica*, a native of the East and of Barbary, which is regarded as the principal source of the Barbary wormseed. The flower-bush of *A. glomerata, A. Lerchiana*, and *A. pauciflora*, natives of the banks of the Volga, are also said to form part of the wormseed of the shops:

and those of *A. Vahliana* are collected in the n.e. of Persia, and form the *Semen Cinæ Levanticum* or *Semen Cinæ in grains*. The flower-buds of *A. cærulescens*, a Mediterranean plant, said to have been found on the sea-coast of England. form the anthelmintic called *Semen Seriphii* or *Barbotine*. Those of *A. camphorata*, another native of the s. of Europe, are used in the same way. Even those of *A. Absinthium* and *A. vulgaris* are used under the name of wormseed.—The plants from which the bitter aromatic liquor called *Extrait, Eau,* or *Crême d'absinthe* is prepared, are small low-growing species of A. (*A. mutellina, A. glacialis, A. rupestris, A. spicata*, etc.), found on the Alps and known to the inhabitants of the Alps by the name of *Genipi*. This liquor was first introduced as a febrifuge during the French campaign in Algeria in 1844, and was mixed by the French soldiers with their wine. They acquired a habit of drinking it diluted with water as a beverage; and its use rapidly extended, with very evil consequences. See ABSINTHE.—MUGWORT (*A. vulgaris*), which, a native of Europe, becoming American, like *A. Absinthium*, and often found in waste places, grows to the height of 3–4 ft., with pinnatifid leaves and somewhat racemed small flowers, which have each five florets of the ray. It emits, when rubbed, an agreeable smell, and has a bitter taste. In Germany, the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds.—SOUTHERNWOOD (*A. abrotanum*) is a shrubby plant with long straight stems, 3–4 ft. high, the lower leaves bipinnate, upper leaves pinnate, their segments hair-like. It is a native of the s. of Europe and middle parts of Asia, and has long been a favorite plant in cottage gardens in Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen; and in some parts of the continent of Europe, as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes efficaciously used when they are swarming, to promote their ascent into the new hive placed over them.—TARRAGON (*A. Dracunculus*) is a perennial plant, native of Siberia, long cultivated in gardens in Britain. It has a branching stem 1–1½ ft. high, with narrow leaves. It is fragrant, and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish-sauce. —The leaves of *A. Maderaspatana* are regarded in India as a valuable stomachic, and are also used in anodyne fomentations.—MOXA (q.v.) is prepared by the Chinese from the leaves of *A. Moxa* and other species, the whole surface of whose leaves is covered with a thick down.—*A. acetica*, a Persian species, is said to have a strong odor of vinegar. Many species of *A.* belong to N. Amer., and characterize especially the dry, barren plains of the west.

ARTEMUS WARD: see BROWNE, CHARLES FARRAR.

ARTERIES, Disease of. The principle diseases of the arteries are atheroma or softening, sclerosis or hardening, and calsification or infiltration of mineral salts; aneurysm is not a disease in itself, but is rather one of the consequences of atheroma, and the same may be said of rupture of an artery in the brain causing apoplexy. A healthy artery can neither dilate to form an aneurysm nor rupture to produce an apoplectic stroke, so that these conditions are the results of disease rather than diseases themselves. *Atheroma* consists in a localized thickening of the internal coat (tunica intima) of an artery and its subsequent fatty and granular degeneration. This degeneration occurs in patches, usually on one side of the artery; it may cause atrophy or thinning of the middle coat of the vessel, and when it subsequently breaks through the lining membrane it leaves an ulcer or little cavity in the wall of the artery. This is a weak spot and the pressure of the blood causes the outer wall gradually to yield in the form of a sacculated dilatation, which is an aneurysm. Sometimes the patch of atheroma becomes infiltrated with lime salts and in this way calsification of an artery is produced. Another result of atheroma of the arteries is impaired nutrition, the effects of which are most serious in the heart and the brain. This interference with the nutrition is due to the roughening and irregularity of the lining of the affected arteries which causes friction and retardation of the blood streams, or to the narrowing of the vessel in consequence of the deposit in its walls which directly cuts off a portion of the blood supply; when this condition is so extreme as to cause actual ablitration of the artery the result may be gangrene of the tissues depending upon the artery for their nutrition.

Sclerosis or hardening of the walls of the arteries, arteriosclerosis it is usually called, is almost universally present in the aged, but occurs not infrequently in those of middle life. The common saying that 'a man is as old as his arteries' refers to arteriosclerosis, the changes commonly associated with old age being apparently due to the same general overgrowth of fibrous material that produces sclerosis in the arteries. In arteriosclerosis there is a fibrous thickening of the walls of the arteries and at the same time the vessels are dilated and usually more or less elongated. This growth of fibrous tissues reduces the elasticity of the vessels and interferes with the general nutrition of the body. As mentioned above, the condition is almost always present in more or less marked degree in the aged, but it may occur in the middle-aged or even in the comparatively young. In the latter the arterial change may follow an attack of one of the infectious diseases, especially typhoid fever, and it is of common occurrence in syphilis; it may be due to the abuse of alcohol and tobacco or to habitual overeating, especially of flesh food; it occurs comparatively early in life in those who are engaged in hard manual labor, and it is also caused indirectly by the physical changes induced by worry. The progress of the

disease can sometimes be arrested by a change in the habits and a return to a more hygienic way of living. The drug most commonly employed in the treatment of the affection is iodide of potassium. Much benefit is occasionally derived in such of the aged as suffer from pronounced arteriosclerosis by the use of a combination of sodium, magnesium, and calcium salts in the proportion in which these exist in normal blood.

Calsification of an artery, in addition to impeding the flow of the blood, may also imperil the integrity of the vessel. Such an artery presents a roughened surface which favors the formation of minute clots which, becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus giving rise to embolism (q. v.). Again, the relation of this disease to accidents and surgical operations on arteries is obvious. A blow may crush a diseased artery, when a healthy, elastic vessel might escape injury. A slight movement such as suddenly lifting the arm to the head for the purpose of securing the hat in a sharp gale, has been known to have been followed by aneurysm of the axillary artery. A ligature applied to any calcified artery is apt to cause it to break, and the difficulty of securing such vessels is often very great.

ARTERIOT'OMY: the opening of an artery: an operation which was sometimes employed as a substitute for venesection when it was desired to produce upon the cerebral circulation a more decided and immediate effect (as in severe forms of apoplexy) than could be produced by ordinary venesection.

ARTERY, n. *ârʹtėr-ĭ* [L. and Gr. *artērĭă*, a windpipe, an artery]: one of the vessels that convey the blood from the heart to all parts of the body. ARTERIAL, a. *âr-tēʹrĭ-ăl*, of or contained in arteries. ARTERIALIZE, v. *âr-tēʹrĭ-al-īz*, to render the blood coming from, or present in, the veins similar to that contained in the arteries; to oxygenate blood. ARTE'RIALI'ZING, imp. ARTE'RIALIZED, pp. *-īzd*. ARTERIALIZATION, n. *âr-tēʹrĭ-ăl-ī-zāʹshŭn*, the process of making into arterial blood. ARTERIOTOMY, n. *âr-tēʹrĭ-ŏtʹŏ-mĭ* [Gr. *tomē*, a cutting]: opening an artery to let blood. ARTERIOLOGY, n. *âr-tēʹrĭ-ŏlʹŏ-jĭ* [Gr. *artērĭă*, an artery; *logos*, a discourse]: a discourse regarding the arteries; that part of medical science which treats of the arteries. ARTERITIS, *âr-tĕ-rīʹtĭs:* see ARTERIES, DISEASES OF.

ARTERY [named from the old idea that these tubes were air-carriers]: the vessels through which the blood passes from the left side of the heart to the tissues throughout the body. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats or *tunics* of the artery: an external, which is elastic, and distensible, a middle, which is muscular, contractile, and brittle; an internal, also brittle, smooth, and transparent, being lined with epithelium on the side washed by the blood. The tube is also enveloped in cellular tissue, termed the *sheath* of the A.

When an A. is wounded by a sharp instrument, the effect varies with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse, the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the A. be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to prevent fatal bleeding. The cut orifice contracts and each coat retracts from the coat external to itself, so that the internal coat is retracted farther than the middle, and the middle farther than the external coat. In addition to this retraction, the three coats curl inward, thus considerably narrowing the orifice, and presenting a surface on which a clot is more readily formed. This clot extends to the first large branch of the artery. The part of the artery, thus plugged becomes in course of time a mere fibrous cord, and the portion of the body previously supplied by this artery is nourished by collateral circulation (see ANASTOMOSIS). See BLEEDING.

The arteries of the human body are all offsets, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the A. of *supply;* and another, which passes almost branchless to supply the parts beyond —the A. of *transmission.* These, however, anastomose (q. v.) freely, so that the distant tissues are not dependent for their supply on only one arterial trunk. Thus, the femoral A. divides in the groin into the profunda, or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into *external* carotid, to supply the neck and head, and the *internal* carotid, to supply the brain. For the principal arteries, see their distinctive titles. See ARTERIES, DISEASES OF.

ARTESIAN-WELLS, n. *âr-tē'zhăn:* borings or perforations made in the earth, in order to obtain a constant flow of water—so called from *Artois,* in France (the anc. *Artesium*), where first used. The possibility of obtaining water in this way in a particular district depends on its geological structure. All rocks contain more or less water. Arenaceous rocks receive water mechanically, and, according to their compactness and purity, part with a larger or smaller proportion of it. A cubic yard of pure sea-sand can contain, in addition to the quantity of dry sand which occupies that space, about one-third of its bulk of water. It would part with nearly the whole of this into a well sunk in it, and regularly pumped from. Chalk and other rocks, composed of fine particles, closely compacted together, contain as large a proportion of water; but from the power of capillary attraction, little or none of this water would be drained into a well sunk in such rock. From the existence, however, of numerous crevices in chalk through which the water freely flows, and from the general presence of a larger quantity of water than the

porous rock is able to retain, wells sunk in chalk often yield water. There is yet a third class of rocks, which are perfectly impervious to water: such are clays, which are absolutely retentive, neither allowing water to be obtained from them nor to pass through them. When such rocks occur in basins (q. v.) in alternating layers, and in such order that pervious beds are inserted between impervious ones, it is evident that if a perforation is made through the retentive barrier-bed in the lower portion of the basin, the water contained in the water-logged strata will rise through the bore to a height depending upon the pressure of water which has accumulated in the confined sloping space between the two impervious beds.

The American system of driving wells, invented by Col. N. W. Green, was first applied 1861, and patented 1868. The plant includes an Andrews patent point for penetrating the earth, this point being coupled to a pipe on which, after it has been driven down to water, an ordinary pump is screwed and the air exhausted, when the water rises rapidly in the tube, whence it is readily lifted by the pump. See BORING. A large number of these wells are in use in the United States for furnishing water for irrigation, stock-raising, brewing, etc. Important wells are in St. Louis (begun 1849), Chicago, Louisville, Columbus, O., Charleston, S. C. (begun 1848), Pittsburg, Penn., The deepest of these wells is that driven for the St. Louis Insane Asylum, 1866–69, 3,843.5 ft. in depth, with a diam. two-thirds of the way of 4½ in. A well in Chicago of 1,200 feet discharges about 1,250,000 gals. with a head of 125 ft. above Lake Michigan.

Many such wells are in London and its vicinity; those which form the ornamental fountains in Trafalgar Square descend into the upper chalk to a depth of 393 ft. One of the most famous artesian wells is that of Grenelle, in the outskirts of Paris, where the water is brought from the gault at a depth of 1,798 ft. It yields 516½ gals. of water in a minute, projected 32 ft. above the surface; temperature 81°.7 F. A well at Kissingen, Bavaria, furnishes a supply of saline water from a depth of 1,878 feet. The deepest well in the world is at Schladenbach, near Leipsic, 5,735 feet.

It is believed that the Chinese have been long acquainted with artesian wells. Such wells have been in use for centuries in Austria, especially in the neighborhood of Vienna, where they are abundant. No knowledge existed as to their source, and consequently the boring for them was engaged in and conducted in a rude and empirical manner. An excavation was made till a bed of clay was reached; on this a perforated mill-stone was laid, and through the hole the clay was bored until water rose. As soon as geology took the position of a science, and the theory of A. W. was propounded, the engineer was able, after the geological survey of a district, to discover whether a supply of water could there be obtained in this way. Already, districts formerly dry and arid have received a plentiful

supply of water by means of such wells and many more applications have yet to be made. (Tchihatchef, at the British Association in 1882, affirmed that A. W. were made in old Greek times in the Sahara, at Baalbek, etc.; and that crabs are found at the bottom of recent ones.) Artesian borings have been executed in the Sahara of the province of Constantine with remarkable success. The first attempt, after a few weeks' labor, produced a constant stream, forming a river and yielding 4,010 quarts of water per minute, at a temperature of 78° F.

A. W. have supplied a portion of the data upon which the internal temperature of the earth has been calculated. They have their origin below that zone which is affected by the changing superficial temperature of the seasons, and consequently the water is of a constant temperature. Thus the Grenelle artesian well has a temperature of 81°.7 F., while the mean temperature of the air in the cellar of the Paris Observatory is only 53°. Observations showed that there was a gradual and regular increase downwards. The results, after every possible caution had been taken to insure correctness, gave a rise of 1° F. for every 55 ft. down to a depth of 1,800 ft., beyond which the rise was more rapid, being 1° for every 44 ft. of descent.

ARTEVELDE, *âr'tă-vĕl-dĕh*, JACOB: d. 1345, Aug. 19: a brewer of Ghent, celebrated as a popular leader in the 14th c. In the war between England and France, he gave his aid to the former, while the counts of Flanders supported the latter. A., after gaining great advantages over the party of the nobles, went too far when he proposed that the son of Edward III. of England should be elected Count of Flanders. For this the Flemings were not prepared, and, in consequence, A. was killed in a popular insurrection. His son Philip, in 1381, was leader of the people of Ghent in their civil war against Bruges, and gained a victory over Count Louis. The latter was afterwards assisted by Charles VI. of France, and Philip was defeated and slain at Rosbeke, 1382.

ART EXHIBITIONS: public displays of the works of art, temporarily brought together with the view of affording gratification and instruction to the community, and sometimes of procuring purchasers for the works exhibited. They have taken place in most of the principal towns of Europe, for more than a century and a half. Though sometimes connected with Art Unions (q. v.), A. E. are much older institutions, though as the offspring of a necessity which did not exist in earlier times they are essentially modern. So long as artists were patronized chiefly by the church, by their respective governments, or by individuals of sovereign rank, their works were placed either in churches, in public buildings, or in palaces, and were thus continually exhibited to the public; but when private patronage came to be their chief support, and their works, if sold at all, were certain to be buried in private houses, the necessity for making arrangements by which they could be displayed to the public either before they were

disposed of, or afterwards with the consent of their owners, became apparent. Until aided by Art Unions, A. E. for the most part had no success. The earliest collective art exhibition was probably that of the members of the Acad. of Fine Arts at Rome; anything of the kind which had previously existed being confined to the works of a particular artist and his pupils, enriched perhaps by a few contributions from his friends. Something of this earlier character probably attached to these Roman exhibitions; and the first art exhibition, in the sense in which we now understand it, seems to have been that of the French Academy, 1673. From 1745 to the period of the Revolution, this exhibition, which from its commencement had been confined to the works of members of the Academy, took place biennially. During the Revolution it was thrown open to foreign artists, and in 1796 it was again made annual. An exhibition was attempted in England, 1760, but it was not till 1769 that the regular exhibitions of the Royal Acad. commenced. The works exhibited in 1760 were only 130, the number of exhibitors being 69; in that of 1880 there were exhibited 1,650 works by about 850 artists. The annual revenue which the Acad. derives from the fee of one shilling by each visitor has also been steadily increasing. The exhibition of the Scottish Acad., next in importance, dates from 1826. To the first exhibition, 178 works were sent by 27 contributors; the exhibition of 1880 consisted of 1,120 works, contributed by 502 artists. The annual revenue of the Scottish Acad. from this source exceeds £2,500. The only other exhibition of the same class in the United Kingdom is that of Dublin, supported by an annual grant from government—the exhibitions of London and Edinburgh being merely furnished with rooms erected at government expense. Several private societies in London and the provinces, however, have similar exhibitions: among these are the British Institution, the Soc. of British Artists, the National Institution, the Soc. of Painters in Water-colors, and its rival, the New Soc. of Painters in Water-colors. There are also exhibitions in several of the large provincial towns, such as Manchester, Liverpool, Glasgow, etc. On the continent of Europe, wherever an acad. of art exists, there is now an exhibition, which takes place for the most part annually, sometimes biennially. In all the large cities, and in many smaller cities of the United States, and in the chief universities and colleges, there are permanent art collections, besides important annual exhibitions under the charge of private societies in increasing numbers.

Art exhibitions are held in every large city of the U. S. under the auspices of art clubs, societies, or schools. The leading societies, as a rule, hold regular annual exhibitions, besides others of special character. The general exhibitions usually aim to be representatively American. Special exhibitions may be confined to the work of one artist or group of artists, or to a special subject, as landscapes, portraits, etc. In 1905 the Society of Art Collectors of

New York City inaugurated a comparative exhibition of American and European art. Other temporary exhibitions are held in art museums under the charge of the museum authorities. In some cases a successful temporary exhibition has led to the establishment of a permanent museum, as in the city of Detroit, Mich.

ARTFUL, AR'TIFICE, etc.: see under ART.

ARTHANITIN, *âr-thăn'ĭt-ĭn* [from *Arthanita officinalis*, a plant now called *Cyclamen Europæum*]: in *chem.*, a crystalline substance which may be extracted from the roots of the *Cyclamen Europæum*, *Primula veris*, *Anagallis arvensis*, and *Limosella aquatica;* called also *Cyclamin.* It is purgative, besides producing vomiting.

ARTHRITIC, a. *âr-thrĭt'ĭk*, or ARTHRITICAL, a. *ăr-thrĭt'-i-kăl* [Gr. *arthron*, a joint]: pertaining to the joints or to the gout. ARTHRITIS, n. *âr-thrī'tĭs*, inflammation of the joints; the gout. See JOINTS: RHEUMATISM: GOUT. ARTHRODYNIA, n. *âr-thrŏ-dĭn'ĭ-ă*, pain in the joints; chronic rheumatism. ARTHRODYNIC, a. *-ĭk*, pertaining to. ARTHROLOGY [Gr. *arthron*, joint; *logos*, discourse]: a discourse concerning the joints; that part of anatomical science which treats of the joints. ARTHROSIS, n. *âr-thrō'-sĭs*, articulation.

ARTHRITIS DEFORMANS, *âr-thrī-tĭs dē-form'ănz:* this disease is called arthritis deformans because it is an inflammation of joints which tends to produce deformity. It was for a long time believed to be closely associated with rheumatism and gout, consequently we have such terms as rheumatoid arthritis or rheumatic gout. Such a relationship, however, is quite doubtful, for in the majority of cases of arthritis deformans it is impossible to obtain a history of either of these diseases. Arthritis deformans is a chronic disease of the joints, the real cause of which is not known but which is characterized by changes in the joints so as to produce a marked deformity. It seems that in many cases exposure to cold and dampness predisposes to the condition; in other cases previous joint diseases or rheumatism appear to play a part; in others it appears to be due to errors in diet, and in still others there is an infection with the different kinds of bacteria. In some cases it may be that arthritis is caused by a specific micro-organism. The changes in the joints differ from those in gout principally by the absence of deposits of sodium urate and from chronic rheumatism in the existence of extensive alterations in the structure of the joints. In many instances there is simply a chronic inflammation with a marked proliference of all of the tissues of which the joints are composed. In other cases there is a marked diminution in the structures of the joints producing the so-called atrophic form; in still others, there is an unusual increase in the amount of bony structure producing what is called the hypertrophic form. Following the changes in the joints there are often contractions of the muscles which cause the extremities to be turned in

one direction or another, and when the hands are involved the fingers usually turn outward. The following forms of arthritis deformans have been recognized:

Heberden's Nodes.—In this form the fingers are principally affected. It is more common in women than in men. It begins usually between the 30th and 40th year. Sometimes they are exceedingly painful, at other times they produce only slight or no pains.

Monoarticular Form.—This affects one joint. It occurs principally in old people, and may affect the hip, knee or shoulder joint.

Polyarticular, or General Progressive Form.—This occurs in two varieties, acute and chronic. The acute form often resembles acute articular rheumatism in the beginning, involving as it does many joints, producing swelling and often some fever. It occurs more in young women between the ages of 20 and 30. The chronic form is more common. The joints are frequently involved symmetrically. The process begins gradually with slight swelling and pain, both of which often become more severe. In some cases the pain becomes agonizing in character; at the same time the joints frequently become locked and the bones forming the joints grow together. After this period is reached the pain usually becomes much less and then entirely disappears and the patient may enjoy good health.

Vertebral form or spondylitis—a form which involves the bone of the vertebral column causing it to become more and more rigid until it is eventually very stiff. It may or may not be accompanied by pain.

Treatment.—The treatment of arthritis deformans should begin early, for if once established it is rarely curable, although after existing for a number of years it may gradually subside leaving only a marked deformity of the parts involved to indicate the former disease condition. The parts involved often become entirely useless. During the early stages the application of chloroform liniment to the affected part, together with massage, will do much to relieve the local condition. The diet should be well regulated. The patient should eat as much good food as can be digested. The treatment received at bathing places sometimes does good—at other times, harm. Medicines in the form of tonics, etc., are of much value.

ARTHRODIA, n. *âr-thrō′dĭ-ă*]Gr. *ar′thrŏō*, I fasten by joints]: a joint in which the head of one bone is received into the socket of another; a ball-and-socket joint. ARTHRODIAL, a. pertaining to.

ARTHROGASTRA: see ARACHNIDA.

ARTHROLOBIUM, *ăr-thrŏ-lō′bĭ-ŭm* [Gr. *arthron*, a joint; *lobos*, a legume]: joint-vetch; a genus of plants belonging to the leguminous order.

ARTHRONOMALUS, *âr-thrŏ-nŏm′al-ŭs* [Gr. *arthron*, a joint; *anōmalos*, uneven, irregular]: a genus of centipedes. A *longicornis*, a British species, is phosphorescent.

ARTHROPODA, n. plu. *ăr-thrŏp′ŏ-dă* [Gr. *arthron*, a joint; *podes*, feet]: a phylum comprising those articu-

lated animals which have jointed appendages, such as antennæ, jaws, maxillæ (or accessory jaws), palpi, and legs, arranged in pairs, the two halves of the body thus being more markedly symmetrical than in the lower animals. It is by far the most numerous in species of any in the animal kingdom, the insects alone probably numbering upward of a million species; other representative or typical forms are the trilobites, king crabs, scorpions, spiders, and myriopods. The skin is usually hardened by the deposition of salts (carbonate and phosphate of lime), and of a peculiar organic substance called chitine. The segments (somites or arthromeres) composing the body are usually limited in number, 20 (or 21) in the crustaceans and insects; while each arthromere is primarily divided into an upper (tergum), lower (sternum), and lateral portion (pleurum). These divisions, however, cannot be traced in the head of either the crustaceans or the insects. Moreover, the head is well marked, with one or two pairs of feelers or antennæ, and from two to four pairs of biting mouth-parts or jaws, and two compound eyes; besides the compound eyes there are simple eyes in the insects. The germ is three-layered, and there is usually in the more specialized forms a well-marked metamorphosis. The *Arthropoda* are most nearly related to the worms, certain annelides, with their soft-jointed appendages (tentacles as well as lateral cirri) and more or less definite head, anticipating or foreshadowing the arthropods. On the other hand, certain low parasitic arthropods, as linguatula, have been mistaken for genuine parasitic worms. The four phyla as proposed by Packard are, beginning with the most primitive: (1) *Palæostraca*, embracing the classes of *Trilobita*; (2) *Merostomata* (*Limulus*), and *Arachnida*; (3) *Pancarida* (*Crustacea*); (4) *Prosogoneata*, including three classes: *Pauropoda*, *Diplopoda*, and *Lymphyla* (*Scolopendrella*); and (5) *Entomoptera*, comprising the *Chilopoda* and *Insecta*; the great majority of the group being winged insects.

ARTHUR, King of a tribe of ancient Britons: supposed to have lived 6th c. He is usually represented as a Christian prince, struggling bravely to maintain the liberty and faith of his country against the pagan Saxons, but there is no evidence for the statement that he fought against the Saxon Cerdic. Neither the Welsh bards nor Nennius assert this; in fact, it is merely an inference drawn from the supposition that the scene of A.'s exploits was the w. and s.w. of England. But Mr. Skene (*The Four Ancient Books of Wales*, vol. i., pp. 50–60) seeks to prove from an examination of Nennius (*Historia Britonum*, cap. 50), that the localities of the twelve great battles which A. fought are in Strathclyde, and therefore that he belongs to the region now called Scotland rather than to England. If there is any reality in A.'s history at all, this is probably the correct view of it, but the influence of Geoffrey of Monmouth's fictions, and of the French romances, succeeded in fixing the Cumbrian prince in the more important part of the

CHESTER ALAN ARTHUR.

Twenty-first President of the United States.

island. It is a curious fact that no mention whatever is made of A. by the venerable Bede, the oldest of our historians, or by the annalists of the *Saxon Chronicle;* and Mr. Skene's explanation, that these authorities only 'record the struggle between the Britons and the Saxons south of the Humber,' is hardly satisfactory.

In the lays of the Welsh bards, supposed to be as early as the 6th and 7th centuries (although no manuscript is extant of older date than the 12th c.), A. and his brave companions are celebrated, but modestly and without miracle. It is in Nennius that the legendary additions begin to develop themselves, though Mr. Skene does 'not hesitate to receive the Arthur of Nennius as the historic Arthur.' Then follow at a distance of three or four centuries the so-called Armoric collections of Walter, arch-deacon of Oxford, from whom Geoffrey of Monmouth (q.v.) professes to translate, and in which the marvellous and supernatural elements largely prevail. Here for the first time the magician Merlin comes into association with A. According to Geoffry, A.'s father, Uther, conceiving a passion for Igerna, wife of Gorlois, Duke of Cornwall, is changed by Merlin into the likeness of Gorlois, and A. was the result. After his father's death, A. becomes paramount leader of the British, and makes victorious expeditions to Scotland, Ireland, Denmark, Norway, and even to France, where he defeats a great Roman army. During his absence, his nephew, Modred, revolts, and seduces Prince A.'s wife, Guanhumara. A., returning, falls in a battle with his nephew; and is carried to the Isle of Avallon to be cured of his wounds. Geoffrey's work apparently gave birth to a multitude of fictions which came to be considered as quasi-historical traditions. From these, exaggerated by each succeeding age, and recast by each narrator, sprung the famous metrical romances of the 12th and 13th centuries, first in French, afterwards in English, from which modern notions of A. are derived. In these his habitual residence is at Caerleon, on the Usk, in Wales, where, with his beautiful wife Guinevere, he lives in splendid state, surrounded by hundreds of knights and beautiful ladies, who serve as patterns of valor, breeding, and grace to all the world. Twelve knights, the bravest of the throng, form the centre of this retinue, and sit with the king at a round table, the 'Knights of the Round Table.' From the court of King A., knights go forth to all countries in search of adventures—to protect women, chastise oppressors, liberate the enchanted, enchain giants and malicious dwarfs, is their knightly mission. A Welsh collection of stories called the *Mabinogion*, of the 14th and 15th centuries, translated into English by Lady Charlotte Guest, 1849, gives an idea of the Arthurian legends. Some of the stories 'have the character of chivalric romances,' and are therefore probably of French origin; while others 'bear the impress of a far higher antiquity, both as regards the manners they depict, and the style of language in which they are composed.' These latter rarely mention A., but the former belong, as Mr. Skene puts it, to the 'full-blown

Arthurian romance.' Early in the 12th c., the Arthurian metrical romance became known in Germany, and there assumed a more animated and artistic form in the *Parzival* of Wolfram of Esehenbach, *Tristan and Isolt* of Gottfried of Strasburg, *Erec* and *Iwein* of Hartmann, and *Wigalois* of Wirnt. The most renowned of the heroes of the Arthurian school are Peredur (Parzival or Perceval), Tristan or Tristram, Iwein, Erec, Gawein, Wigalois, Wigamur, Gauriel, and Lancelot. From France, the Arthurian romance spread also to Spain, Provence, Italy, and the Netherlands, and was again retransplanted into England. One of the publications that issued from the press of Caxton (1485), was a collection of stories by Sir Thomas Malory, either compiled by him in English, from various of the later French prose romances, or translated directly from an already existing French compendium. Copland reprinted the work in 1557, and in 1634 the last of the black-letter editions appeared. A reprint of Caxton's *Kynge Arthur*, with an introduction and notes by Robert Southey, was issued in 1817 (*The Byrth. Lyfe, and Actes of Kyng Arthur*, etc., 2 vols. 4to). The best edition is that by Thomas Wright (Lond. 3 vols., 1866) from the text of 1634. The name of King A. was given during the middle ages to many places and monuments supposed to have been in some way associated with his exploits, such as 'Arthur's Seat' near Edinburgh, 'Arthur's Oven' on the Carron near Falkirk, etc. What was called the sepulchre of his queen was shown at Meigle, in Strathmore, in the 16th c. The interest of the legends about King A. and his knights has been revived by Tennyson's *Idylls of the King* (1859 *et seq.*), and some of Wagner's operas. See Turner's *History of the Anglo-Saxons;* Ritson's *King Arthur ;* Villemarqué, *Contes Populaires des Anciens Bretons* (1842) ; Grässe, *Sagenkreise des Mittelalters* (1842) ; Skene's *Four Ancient Books of Wales* (1868) : Glennie's *Arthurian Localities* (1869) ; Cox's *Popular Romances of the Middle Ages* (1871) ; Fontan, *Arthur, ou le Roi-chasseur* (1874).

ARTHUR, Prince of Brittany: see King JOHN.

ARTHUR, CHESTER ALAN: twenty-first president of the United States; 1830, Oct. 5.—1886, Nov. 18, b. in Franklin co., Vt.; son of a Baptist minister, of Scotch-Irish extraction. He distinguished himself as a student at Union College, New York ; studied law, and was admitted to the bar at an early age. At the outbreak of the great civil war, 1861, he held the post of inspector-general ; and during the war was quartermaster-general for the New York forces. He subsequently returned to law practice, and became the head of an eminent law firm. A. was prominent in politics, on the republican side ; and in 1871 Pres. Grant appointed him collector of customs at the port of New York. Not being an advocate of the administrative system known as Civil Service Reform, which Pres. Hayes favored, the pres. removed him from this post, 1878, and he returned to the practice of law. He was a leader of the republican party in the state of New York ; and

though belonging to the section of the republicans opposed to that represented by Gen. Garfield, was elected vice-pres. of the United States when Garfield was elected to the presidency, 1881. The death of Garfield, resulting from an assassin's pistol-shot, called the vice-pres. to the supreme magistracy; and, 1881, Sept. 22, A. was inaugurated president, in which office he served till the end of the term, 1885, March 4. Returning to New York, his already failing health restrained him from public activity, and his death occurred in the following year. As a political leader A. had great energy and success, though his later leadership became unfortunately identified with a faction in his party; as president, he rose to the new demands and the peculiarly difficult duties of the exalted office to which an assassination had introduced him; winning in large degree the approval of former opposers by the dignity and fidelity of his administration.

ARTHUR, Joseph Charles, an American botanist: b. Lowville, N. Y., 1850, Jan. 11. He was graduated from Iowa State College in 1872, and subsequently studied at the universities of Johns Hopkins, Harvard, and Bonn, Germany. He was instructor in the universities of Minnesota and Wisconsin; botanist at the Experiment Station, Geneva, N. Y., and is now professor of vegetable physiology and pathology, Purdue University, Lafayette, Ind., and botanist to the Indiana Experiment Station. He has written (with Barnes and Coulter) *Handbook of Plant Dissection* (1886); (with MacDougal) *Living Plants and Their Properties* (1898).

ARTHUR, Julia, the stage name of Ida Lewis, an American actress: b. Hamilton, Ont., 1869, May 3. She made her professional début at the age of 13 as the Prince of Wales in *Richard III.* After a year's study in Germany she joined a company in California, playing leading parts in *Jim the Penman, Captain Swift, The Colleen Bawn, Arrah-na-Pogue, The Silver King, Uncle Tom's Cabin, The Still Alarm, Peril, Divorce,* and *The Private Secretary.* Her first New York success was in 1892, February, in *The Black Masque.* During the next year she played Jeanne in *The Broken Seal,* Letty Fletcher in *Saints and Sinners,* Lady Windermere in *Lady Windermere's Fan,* etc. She made her London début 1895, February, in Henry Irving's company, playing roles next to Helen Terry, such as Elaine in *King Arthur,* Sophia in *Olivia,* Rosamond in *Becket,* and Imogene in *Cymbeline.* She accompanied Irving and Terry to America in 1896. Since then she has starred chiefly in the United States, her latest plays being *A Lady of Quality* (1896); *Ingomar* (1898); and *As You Like It* (1898). She is the wife of B. P. Cheney. See Strang, *Famous Actresses of the Day in America,* (1899); Browne and Austin, *Who's Who on the Stage* (1906).

ARTHUR, P. M., American locomotive engineer: b. Scotland 1834; d. Winnipeg, Manitoba, 1903, July 16. He came to America in childhood and as a young man

was at first a blacksmith's helper in the employ of the New York and Harlem Railroad Company and later an engineer on the New York Central railroad. In 1873 he became the grand chief of the American Brotherhood of Locomotive Engineers, which post he filled at the time of his death.

AR'THUR, Timothy Shay, an American author; b. Newburg, N. Y., 1899; d. Philadelphia, 1885, March 6. In 1852 he founded 'Arthur's Home Magazine.' He was a voluminous writer of moral and domestic tales. His works are over 100 in number, and have had a large sale in England as well as in the United States. His most popular work was the famous 'Ten Nights in a Bar-Room.' Among his other publications were 'Tales for Rich and Poor,' 'Tales of Married Life,' and 'Lights and Shadows.'

ARTHUR'S SEAT: a hill in the immediate vicinity of Edinburgh, 822 ft. above the level of the sea. The ascent is easy, and the prospect from the top unrivalled. A. S. is supposed to derive its name from Arthur, the British king. When the hill received this appellation is not known; but at the close of the 15th c. the poet Kennedy mentions 'Arthur Sate or ony hicher hill.'

The hill is formed of a mass of trap of various species, upheaved through the carboniferous strata of Central Scotland, and presenting on the w. and s. sides, at the height of 570 ft., a perpendicular range of precipices, called Salisbury Crags, 60 to 80 ft. high. The trap is in tabular masses, and has elevated and hardened the carboniferous sandstone, shale, and limestone beds, which dip e., and crop out on the w., besides being broken through and overflowed by the trap-rocks. In the centre of the hill, the trap often encloses fragments of sandstone, and divides it by veins. The central and upper part of the hill, and the remarkable columns called 'Samson's Ribs,' are of basalt.

ARTIAD, n. *âr'tĭ-ăd* [Gr. *artios*, complete, even, opposed to odd]: in *chem.*, name given to elements of even equivalency, as dyads, tetrads, etc.; those of uneven equivalency, as monads, triads, etc., are called perissads [Gr. *perissos*, uneven].

ARTICHOKE, n. *âr'tĭ-chōk* [F. *artichaut*—from It. *articiocco*]: a thistle-like perennial plant, now growing wild in the s. of Europe, but probably a native of Asia; the *Cyn'ăra-scol'ymus* or *C. Cardunculus*. The genus *Cynara* belongs to the natural order *Compositæ*, sub-order *Cynarocephalæ*, and is distinguished by the bracts of the involucre being fleshy at the base, and emarginate, with a hard point and the receptacle fringed. *C. scolymus* has the radical leaves 3–4 ft. long, somewhat spiny, some of them pinnatifid, some undivided. The stem is two or three ft. high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The involucre is tumid, and consists of fleshy, roundish-ovate, crenate, acuminate,

imbricated scales. The seeds are elongated and quadrangular, with smooth and firmly attached pappus. The plant has been long cultivated for the sake of the delicate succulent *receptacles* of the heads of flowers, taken before the flowers expand, which are boiled and eaten, or, on the continent of Europe, eaten raw with salt and pepper. The part used is the same which in thistles is called by children the *cheese*, and is sometimes eaten by them. The tender central leaf-stalk is also occasionally used in the same way as that of the Cardoon. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about four ft. asunder, and two ft. apart in the row. The A. bed continues productive for several years. Seaweed is an excellent manure for it.—The CARDOON (q.v.) belongs to the same genus.—The JERUSALEM A. (q.v.) is a totally different plant.

ARTICLE, n. *ȧr'tĭ-kl* [F. *article*—from L. *artic'ulus*, a little joint—from *artus*, a joint: It. *artĭcolo*]: a jointed thing or part; a clause or item; a particular thing; a contribution in a periodical; in *gram.*, a word put before a noun to point it out and limit its application: V. to bind by conditions; to stipulate. ARTICLED, pp. *ȧr'tĭ-kld:* ADJ. bound by conditions. ARTICULATE, v. *ȧr-tĭk'ū-lāt* [L. *artĭculātus*, furnished with joints]: to unite by means of joints; to pronounce words distinctly; in *OE.*, to make terms; to treat: ADJ. distinct; jointed. ARTIC'ULATELY, ad. *-lĭ.* ARTIC'ULATENESS, n. the quality of being articulate. ARTICULATION, n. *ȧr-tĭk'ū-lā'shŭn*, the uniting together by means of joints, as in the bones of a skeleton; distinct pronunciation; an arrangement of joints. ARTIC'ULATING, imp. ARTIC'ULATED, pp.: ADJ. possessing joints. ARTICULATOR, *ȧr-tĭk'ū-lā'tẽr*, one who articulates. ARTICULAR, a. *ȧr-tĭk'ū-lẽr*, of or belonging to the joints. ARTIC'ULARLY, ad. *-lĭ.* ARTICULATA, n. plu. *ȧr-tĭk'ū-lā'tă*, one of the great divisions of the animal kingdom, designating those creatures which are encircled by jointed rings, as worms, lobsters, etc., now frequently known by the name ARTHROPODA. ARTICLES OF ROUP, in *Scot.*, the written or printed conditions binding on purchasers at a public sale by auction. ARTICLES OF WAR, the military code of laws for the government of soldiers. LORDS OF ARTICLES, in *Scot. hist.*, the committee of Scottish parliament who prepared all articles and bills in proper form to be placed before parliament. THIRTY-NINE ARTICLES, the summary of doctrines containing the authorized teaching of the Church of England.

AR'TICLE: in general a part of a systematic whole. Thus, we speak of the several articles of a confession; the articles of war; a leading article, etc.

The use of A. as a grammatical term arose as follows. In such a sentence as, 'He found *that* (or *the*) man *that* he was looking for,' the Greeks considered the defining particles as connecting the two parts of the sentence, and

called them joints [Gr. *arthra*, Lat. *articuli*); the name was subsequently confined to the first of the two, the other being called the relative.

In English, there are two articles—the definite *the*, and the indefinite *a* or *an;* and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the older Germanic languages, the Mœso-Gothic and Old Norse, e.g., had only the definite A. 'In no language,' says Dr. Latham, 'in its oldest stage, is there ever a word giving, in its primary sense, the idea of *an* or of *the*. As tongues become modern, some word with a *similar* sense is used to express the relation. In the course of time, a change of form takes place, corresponding to the change of meaning.'

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of *that* (Anglo-Sax. *thæt*). The same is the case with Ger. *der;* and French *le*, Ital. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, 'that.' In like manner, *an* or *a* is from the old form of *one* (ane); Ger. *ein* is both *one* and *a;* and so are Fr. *un*, Ital. and Sp. *uno*, both from Lat. *unus=one*.

In the Scandinavian tongues, the article is attached to the end of the word; the Danish, e. g., writes *kong-en*, the king; *hus-et*, the house.

ARTICLES OF FAITH: summary of religious views, set forth by a church or a company of churches, and used in many cases as a denominational standard. See CREEDS AND CONFESSIONS.

ARTICLES OF WAR: regulations made for the government of the military and naval forces of the country; laws, or rules, governing the modes of trial and of punishment for breaches of discipline, and denominating the offenses to which these modes are appropriate.

United States Army.—The articles in force are comprised in an act of congress 1806, Apr. 10, revised in 1880, and are 128 in number, of which 80 refer to punishments, the remainder relating to organization of courts-martial and courts of inquiry, and cognate subjects. The following is a summary. Officers can be tried only by general courts-martial, and, unless impossible, only by officers of their own or higher rank. Officers commanding army corps, regts., garrisons, or forts, are empowered to order courts for trial of enlisted soldiers for all offenses except such as are capital; and in time of war, a field officer can be detailed in each regt. to try such minor offenses. Such courts cannot punish by imprisonment for more than 1 month, nor by fine exceeding one month's pay. Officers under arrest are entitled to see a copy of charges brought against them, and to trial within a specified time. In time of peace any gen. officer in command of an army or a dept., and in time of war any division or brigade commander, is authorized to order a general court-martial; but in case such gen. officer or commander is the accuser,

the court is appointed by the pres., and its findings must be sent to the sec. of war, and by him to the pres. for approval. Offenses include unlawful enlistments, wasting or spoiling ammunition or accoutrements, disrespect toward a superior officer, challenge to a duel, fraud, embezzlement, etc. Punishments include fine, imprisonment, dismissal, and death. Since 1875, flogging as a punishment has been abandoned; and branding, marking or tattooing are forbidden. The punishment of death can be inflicted only after confirmation by the pres., except in the case of spies, mutineers, and murderers, guerillas, and others who commit crimes in violation of the laws of warfare; and in the cases of sleeping on post, inciting to mutiny, cowardice in the presence of the enemy, etc.

United States Navy.—Sixty articles govern procedure in cases of insubordination or crime, and are applied by courts-martial. The offenses and punishments enumerated vary little from those above cited for the army. No officer is subject to dismissal or death, except when the sentence has been confirmed by the pres.; for all other cases the designated punishment can be inflicted by the officer who orders the court. Offenses committed on shore receive the same punishment as if committed at sea. The proceedings of a court-martial are subject to revision, and the sentence to remission or mitigation, by the officer ordering the court-matrial. The punishment of death, where authorized, need not necessarily be inflicted by the court-martial, which is empowered to substitute therefor imprisonment for life.

ARTICLES, THE SIX: often mentioned in the ecclesiastical history of England in the 16th c.; imposed by act of parliament, 1539, when Henry VIII. was displeased with some of the bishops most favorable to the Reformation, and their opponents for a time regained the ascendency. These A. asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing them was popularly called 'the six-stringed whip.' Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation.

ARTICLES, THE THIRTY-NINE, of the Church of England: articles of religion agreed upon by the archbishops and bishops of both provinces and the whole clergy in the convocation at London, 4th year of Elizabeth, 1562, under Abp. Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, forty-two in number, in the reign of Edward VI. The council appointed in the will of Henry VIII. to conduct the government during

the king's minority, was for the most part favorably disposed towards the Reformed opinions, and the management of church affairs devolved almost entirely upon Abp. Cranmer. In the year 1549, an act of parliament was passed, empowering the king to appoint a commission of 32 persons, to make ecclesiastical laws. Under this act, a commission of 8 bishops, 8 other divines, 8 civilians, and 8 lawyers (among whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, Justice Hales, etc.) was appointed, 1551, and one of its first acts was to draw up a code of articles of faith. These were forty-two in number, and were set forth by the king's authority in 1553. Strype and Burnet make it appear that these forty-two articles were agreed upon in the convocation that was sitting in 1552, but this was not the fact. To these articles was prefixed the Catechism, and there is no doubt that Cranmer had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication, Edward died, and one of the first acts of the convocation summoned with the parliament in the first year of Queen Mary was to declare that these forty-two articles had not been set forth by the agreement of the house, and that they did not agree thereto. In 1558, Elizabeth succeeded her sister. In 1559, Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed Church. Parker applied himself to this work, and for the purpose revised the forty-two articles of King Edward, rejecting four of them entirely, and introducing four new ones, viz., the 5th, 12th, 29th, and 30th as they now stand, and altering more or less seventeen others. This draft Parker laid before the convocation which met in 1562, by which further alterations were made; and the 39th, 40th, and 42d, of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to thirty-nine. They were drawn up and ratified in Latin, but when they were printed, both in Latin and English, the 29th was omitted, and so the number was further reduced to thirty-eight. From these thirty-eight there was a further omission, viz., of the first half of the 20th article, which declares that 'the church hath power to decree rites and ceremonies, and hath authority in controversies of faith.' As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how the omissions arose. However, in 1571, the articles once more underwent revision. Abp. Parker and Bp. Jewel made a few slight alterations, and the 29th being restored, the convocation which was then sitting ratified them both in Latin and English, and an act of parliament was passed

in that year compelling the clergy to subscribe 'such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments.' There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the thirty-nine articles as they now stand. 'His Majesty's Declaration,' which precedes them, and directs that they shall be interpreted 'in their literal and grammatical sense,' was prefixed by Charles I. in 1628.

It is interesting to know from what other sources the thirty-nine articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording, with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. Some of them, as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII., and annotated by the king's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it only existed in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melanchthon.

The thirty-nine articles have been described as 'containing a whole body of divinity.' This can hardly be maintained. They contain, however, what the Church of England holds to be a fair scriptural account of the leading doctrines of Christianity, together with a condemnation of what she considers to be the principal errors of the Church of Rome, and of certain Protestant sects. As far as they go (and there are many things unnoticed by them) they are a legal definition of the doctrines of the Church of England and Ireland; though it is to the *Book of Common Prayer* that members of that communion look for the genuine expression of their faith. They were adopted by the convocation of the Irish Church in 1635, and by the Scotch Episcopal Church at the close of the 18th c. Corpus Christi College, Cambridge, contains the only copies of the A. in manuscript or print that are of any authority. Among them are the Latin manuscript of the A. of 1562, and the English manuscrpit of the A. of 1571, each with the signatures of the archbishops and bishops who subscribed them.

For other 'Articles,' see LAMBETH: PERTH: SCHMALKALD.

ARTICULATA, *ar-tik'ŭ-lā'tă* (or ARTICULATED ANIMALS): one of the great primary divisons of the animal kingdom, according to the system of Cuvier (see ZOOLOGY), and including those animals of which the body is distinctly segmented—the higher worms, as well as Insects, Crustaceans, Arachnids, and Myriapods. The four latter groups were separated from the Annelida (q. v., and see also the article WORMS) by Von Siebold, on account of their pos-

session of hollow jointed limbs, into a separate subkingdom, Ahthropoda. The term Arthropoda is now used instead of Articulata.

ARTHROPODA.—In this great division of the animal kingdom, the body consists of a usually definite number of segments, each bearing a pair of hollow and almost always jointed limbs, into which the body muscles proceed.

In all cases, the epidermis gives rise to an external horny layer of *Chitine* (q. v.), which usually attains considerable strength and thickness, and in Crustaceans is further strengthened by impregnation with salts of lime. The segments of the body and their corresponding appendages exhibit considerable differentiation, especially in the anterior region of the body, where also some or many segments may completely coalesce, their appendages also becoming extraordinarily modified for various functions; so that it requires the combined research of both the embryologist and the comparative anatomist, to analyze the organism into its constituent parts. The nervous system is a ventral chain of ganglia united by longitudinal and transverse commissures, and one pair of ganglia is developed for each segment, although some of those also coalesce more or less completely in the adult.

The A. divide naturally into two great alliances—the water-breathers, or *Branchiata* (see GILLS), and the air-breathers, or *Tracheata* (see RESPIRATION); the former including the *Crustacea*, and the latter the *Prototracheata* or *Peripatidea*, the *Myriapoda*, the *Arachnida*, and the *Insecta*. For the relation of the Arthropoda to other groups, see ZOOLOGY. Also, see CRUSTACEA: MYRIAPODA: ARACHNIDA: and INSECTS: the group *Peripatidea* having been most recently established as a distinct class. The *Peripatidea* are represented by a single genus, *Peripatus*, which appears, both from its extreme simplicity of structure and its wide distribution (S. Amer. and the Antilles, S. Africa, New Zealand) to be of very remote antiquity. At first supposed to belong to a mere subclass of Annelids, its arthropod character was not established till the voyage of the *Challenger*, when the discovery was made that it has distinct tracheæ, which open irregularly over the surface of the body, instead of being disposed in regular relation to the segments. Its segments and their appended limbs, its visceral anatomy, and its development are all distinctly arthropodan, and show that we have here one of the most primitive forms of the Tracheate Arthropoda. *Peripatus* is about 1½ inches long, inhabits decayed wood, and has the curious and suggestive habit of spinning a web over itself when alarmed.

ARTICULATE SOUNDS: see LETTERS.

ARTICULATION: see JOINTS.

ARTICULITE, *ȧr-tĭk′ū-līt* [L. *articulus*, a little joint: Eng. suf. *-ite*]: a mineral, called also itacolumite, a variety of quartz (q. v.).

ARTIFICIAL LIMBS: known only since the time of Ambrose Paré, whose *Œuvres de Chirurgie* were pub. 1575—with the exception that there is recorded the celebrated artificial hand of the German knight, Götz von Berlichingen*—who lived in the early part of the 16th c. (1513), and who was named *The Iron-handed*—which weighed three pounds, was so constructed as to grasp a sword or lance, and was invented by a mechanic of Nuremberg. The twelfth chapter of Ambrose Paré's volume, translated by Thomas Johnson, 1605, shows 'by

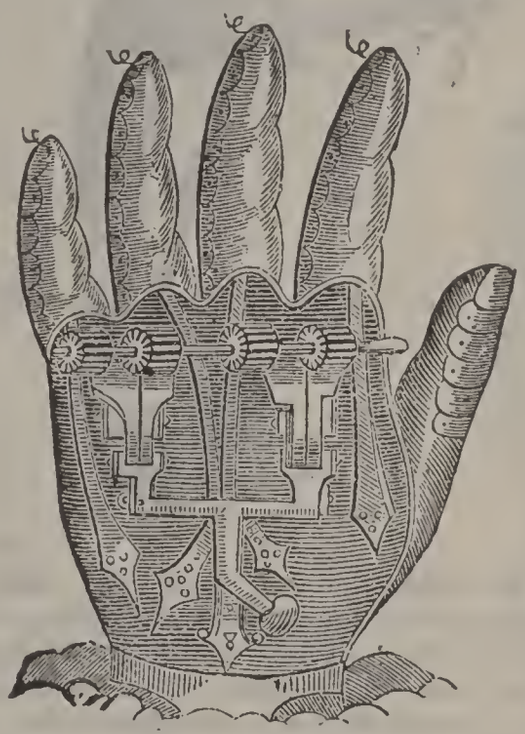


Fig. 1.

what means arms, legs, and hands may be made by art, and placed instead of the natural arms, legs, and hands that are cut off or lost.' The accompanying figures are copies of his drawings of 'an hand made artificially of iron' (Fig. 1), and of 'the form of an arm made of iron verie artificially' (Fig. 2). He also gives a drawing of 'a wooden leg made for a poor man' (Fig. 3), which is simply the common wooden leg with bucket receptacle still in use. No improvements worthy of record were made from the time of Ambrose Paré to the beginning of the present c., when Baillif of Berlin constructed a hand which did not exceed a pound in weight, and in which the fingers,

* The iron hand of this knight, who has been immortalized by Goethe, is preserved at Jaxthausen, near Heilbronn, and a duplicate of it is in the Schloss at Erbach, in the Odenwald. It is stated in Scott's *Border Antiquities*, vol. ii., p. 206, that the family of Clephane of Carslogie 'have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel,' which was conferred by one of the kings of Scotland on a laird of Carslogie, who had lost his hand in the service of his country.—See *Notes and Queries* for 1867, July 17, p. 35.

without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat, and even a pen. The modern artificial hands are mainly modifications, with slight improvements, of this invention

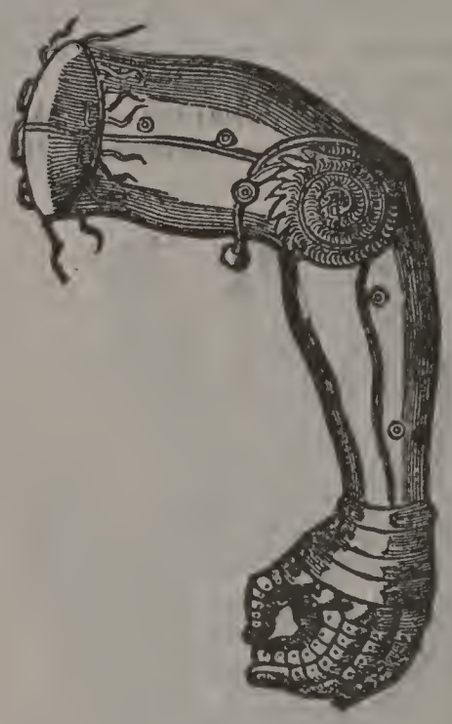


Fig. 2.

of Baillif. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one which includes about two-thirds of the fore-arm; while a stump formed by amputation at the wrist is very unsatisfactory. The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated, and therefore more expensive, pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and India rubber. Provision has been made for attaching various instruments to its palm, such as special hooks, which can be removed at pleasure, for driving, shooting, etc.; apparatus for using the knife and the fork, for grasping the pen, etc.; indeed, the number and variety of instruments capable of being applied to an artificial hand are very great. Nothing has tended so much to the very highest development of artificial arms and hands, as an accident which happened more than a

quarter of a century ago, to the celebrated French tenor, M. Roger, who lost his right arm above the elbow. It was necessary, for his future appearance on the stage, that he should have an artificial limb, which would serve the purposes of histrionic action, and permit him to grasp a sword and draw it from its scabbard. Such a contrivance was invented in 1845 by Van Petersen, a Prussian mechanician, and the French Academy of Sciences commissioned MM. Gambey, Rayer, Velpeau, and Magendie to report upon it. Van Petersen's conceptions have been further extended and improved by others.

Artificial legs having fewer requirements to perform than artificial arms, are comparatively simple in structure. We borrow the description of our figure of the ordinary bucket leg in common use among the poorer classes from Bigg's *Orthopraxy*. 'It consists of a hollow sheath or bucket, A, accurately conformed to the shape of the stump, and having—in lieu of the more symmetric proportions of the artificial leg—a "pin," B, placed at its lower end to insure connection between it and the ground. This form of leg is strongly to be recommended when expense is to be avoided, as it really fulfils all the conditions excepting external similitude embraced by a better piece of mechanism. It is likewise occasionally employed with benefit by those patients who, from lack of confidence, prefer learning the use of an artificial leg by first practicing with the commonest substitute.' As, when the body rests on a single leg, the centre of gravity passes through the tuberosity of the ischium, it is essential that the bucket should be so made as to have its sole point of bearing against this part of the pelvis.

Fig. 3.

Of the more complicated forms of artificial leg three are especially popular. The first of these is of English origin, and owing to its having been adopted by the late Marquis of Anglesea, is known as the *Anglesea leg*. For a description of it, the reader is referred to Gray's work on *Artificial Limbs*, one of the firm of Grays having been the constructor of the legs used by the marquis. This was for a long time *the* fashionable artificial leg. The second leg worthy of notice is that invented by an American named Palmer, and called the *Palmer leg*. From its lightness and the greater ease of walking with it, it has long superseded the Anglesea leg in America. In the third of these legs, also invented in America, and known as *Dr. Bly's leg*, the principal faults of the two other legs have been completely overcome.

In cases of arrested development of the lower limbs,

short-legged persons may be made of the ordinary height by the use of two artificial feet placed twelve or more inches below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle.

Other parts, not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery, deficiencies of the nose, lips, and palate can usually be remedied by an operation; cases, however, may occur where an artificial organ is required. Artificial ears are moulded of silver, painted the natural color, and fixed in their place by a spring over the vertex of the head. Loss of an eye causes sad disfigurement; but the artificial eyes of Boissonneau (see his *Renseignements Généraux sur les Yeux Artificiels*) can hardly be detected.

ARTILLERY, n. *ȧr-tĭl'lėr-ĭ* [F. *artillerie*, engines of war —from mid. L. *artĭllārĭa*, any kind of warlike weapons or machines; *artillātor*, a maker of machines—from *artem* in mid. L. sense, 'art of war']: weapons of war of any kind; cannon; great guns, etc. ARTILLERYMAN, the man who assists to manage a cannon. ARTIL'LERIST, n. one skilled in gunnery.

ARTILLERY: sometimes meaning large cannon or ordnance of every kind; sometimes including the shot and shells; sometimes applying to the soldiers who manage the cannon. For large pieces of ordnance, as a class, see CANNON: for specialties see CARRONADE: HOWITZER: GUN: MORTAR: etc.: and in some cases the names of the inventors, as ARMSTRONG GUN: LANCASTER GUN: etc. See also FIREARMS: RIFLED ARMS: GUNNERY: SHELLS: SHOT. The term *Equipment of A.* is applied to a combination of men, *matériel*, and horses, suitable for coast-defenses, sieges, or the arming of fortified posts. There are several kinds of equipments of *light* A., under the names of horse, field, rocket, mountain, and reserve; and others of *heavy* A., for the attack and defense of coasts and fortified places. These various equipments are generally divided into smaller collections called *Batteries* (q. v.), for more easy control and maneuvering. *Park of A.* is a collective name given to the whole of the guns, carriages, ammunition, and other appurtenances essential to the working of field or siege A.

Artillery Corps.—Before the invention of gunpowder, the larger projectile weapons, sometimes called *engines of war*, sometimes *artillery*, were worked by rough soldiers, who needed no particular apprenticeship to that art. When, however, large balls of iron came to be propelled by the tremendous force of gunpowder, a great revolution gradually took place, though garrison-guns and siege-guns were improved more rapidly than field-guns. Nevertheless, field-guns changed the whole aspect of military tactics; for it became necessary that an army should form in order of battle at a much greater distance from the enemy than in older times. And as cannon were made more rapidly movable, so did tactics vary. Gradually, a body of men was

set apart to study the force and action of gunpowder, the flight and range of projectiles, the weight and strength of cannon, and the maneuvering of heavy masses. The French were the first to make these researches; after them, the English; and later, the Germans. During the Thirty Years' War, an important step was taken in Germany—that of including the artillerymen, who were till then a sort of guild, as a component in the regular army. Gustavus Adolphus in Sweden, Frederick II. in Prussia, and Napoleon I. in France, all attached a very high degree of importance to the A. as an arm of the service. After the great wars in the beginning of the present century, nearly all the states of Europe formally recognized the A. as the third great branch of military service (next after the infantry and cavalry); indeed, in almost all present armies, it takes practically the first place.

Field-A, or *Light A.*, is designed for service in the field, and comprises flying A., foot A., horse A., and mountain A. Flying A., as its name indicates, is intended to execute very rapid evolutions, the guns and the gunners, with the ammunition chests, etc., being moved from one position to another in the field by horses. Foot A. is served by artillerymen on foot, and accompanies bodies of infantry. Horse-A. consists of light guns or machine guns; the gunners are mounted while executing maneuvers. Mountain-A. comprises light guns of small calibre, which are mounted on light carriages or borne on the backs of pack animals. The field-A. of an army or military establishment is divided into *batteries*, each consisting of 4–8 guns, with a certain complement of wagons, men, and general outfit. For an army in the field, 3 pieces of A. to 1,000 infantry is the approved proportion. *Heavy A.* comprises sea-coast A. and siege-A. The guns of the sea-coast A. service are of the heaviest kind and are mounted in permanent works. Siege-A., consisting of heavy guns mounted on carriages for transportation, accompanies armies in their operations: it is employed to defend field works or to reduce the works of an enemy.

Artillery Schools.—The headquarters for A. instruction in England are at Woolwich. France has seven A. schools. In Prussia, the A. and engineer schools are combined.

The School of Artillery for the U. S. army is at Fort Monroe. A col. of the artillery is in command, assisted by a lieut. col. and a major. The course of study occupies one year, and includes ballistics, sea-coast engineering, electricity, mines and mechanisms, artillery, coast-defense, chemistry, explosives, etc.

ARTIODACTYLA, n. plu. *ȧr'tĭ-ō-dăk'tĭ-lă* [Gr. *ar'tĭŏs*, even; *dak'tulos*, a finger, a toe]: a division of the hoofed quadrupeds in which each foot has an even number of toes, as two or four. The great mammalian order Ungulata (see MAMMALIA: UNGULATA) is divided into two groups; first, the *Perissodactyla*, including the horse, tapir and rhinoceros, besides a multitude of extinct forms, and distinguished by the third digit of each limb being sym-

metrical in itself, by the presence of an odd number of digits on the hind-foot, by the number of dorso-lumbar vertebræ being at least twenty-two, and so on; while the second sub-order, the *Artiodactyla*, have the third digit, unsymmetrical in itself, but forming a symmetrical pair with the fourth digit. While the hind-foot bears an even number of digits, the number of dorso-lumbar vertebræ never reaches twenty-two, and rarely exceeds nineteen. Numerous minor osteological differences exist between the two sub-orders, which broadly correspond to the ancient divisions of solid-hoofed and cloven-hoofed respectively. See Foot.

The A. divide into two groups—the *Non-ruminantia* and the *Ruminantia*. The former have usually more than one pair of upper incisors, and the molars have a more or less tuberculated pattern, whence they are frequently termed *Bunodonta*. The metatarsal bones remain separate, and there are no horns. The stomach has rarely more than two divisions. The *Non-ruminantia* include two existing families, *Suidæ* and *Hippopotamidæ*. The *Suidæ* (pigs) have the skin moderately thick and hairy; the third and fourth toes are much longer than the second and fifth. The teeth are frequently as many as forty-four, and the molars are multituberculate. The *Hippopotamidæ* have the skin extremely thick, with scanty hairs; the head, body, and limbs extremely massive; and the four toes resting on the ground. The *Ruminantia* have never more than one pair of upper incisors. In the lower jaw, the canines closely resemble and are situated beside the six incisors, which thus seem to have increased to eight. The molars bear a double series of crescentic ridges, whence the name *Selenodonta* is frequently applied to the ruminant group. The stomach has at fewest three, and usually four divisions. Thus in the sheep or ox, the cardiac portion of the stomach is differentiated into the enormous *rumen*, or paunch, and the *reticulum*, or honey-comb stomach, with which it communicates. After the fodder has been chewed again, it passes readily into the third division, the *psalterium*, or manyplies, which acts as a filter, and allows only the finely-comminuted portions of the food to enter the highly glandular *abomasum*, or rennet stomach, in which gastric juice is secreted, and proteid digestion goes on.

The existing groups of ruminants are the *Tragulidæ*, the *Cotylophora*, and the *Camelidæ*. The *Tragulidæ* (sometimes erroneously termed musk-deer) are the least differentiated forms, and show interesting affinities to the non-ruminants. The *Cotylophora*, including the ox and deer tribes (Bovidæ and Cervidæ), are the central family, broadly distinguished by the cotyledonary placenta and the structure of their horns; those of the Cervidæ being naked, deciduous, and annually renewed processes of the frontal bones; while those of most Bovidæ (sheep, antelopes, oxen, buffaloes) are non-deciduous processes of the frontal bone, covered by the thickened and hardened epidermis known as horn. But

in one sub-family, the giraffes, the horns arise as separate ossifications, and are covered by hairy skin.

The third family, the *Camelidæ*, are aberrant ruminants. They walk on broad integumentary cushions, developed below the phalanges of the third and fourth toes, which alone are developed, the nails not forming hoofs. Large pointed canines are present in each jaw. The stomach has a characteristic structure. The placenta is diffused. There are only two existing groups—the Camels of the old world, and the Llamas of the new.

ARTIODACTYLE, a. *-tīl:* having an even number of toes. See RUMINANTIA: BOVIDÆ: DEER: also HOG: HIPPOPOTAMUS: ANTELOPE: SHEEP: OX: BUFFALO: GIRAFFE: CAMEL: LLAMA: ALPACA: etc.

AR'TISAN, n : see under ART.

ARTIST, n. *âr'tĭst* [L. *artem*, an art]: one who exercises any of the fine arts or crafts, particularly that of a painter, a sculptor, an architect, or a photographer. ARTISTE, n. *âr-tēst'* [F. *artiste*, an artist—from L.]: a female painter, musician, singer, or dancer. ARTISTIC, a. *âr-tĭs'-tĭk*, or ARTIS'TICAL, a. *-tĭ-kăl*, of an artist; according to a high degree of art. ARTIS'TICALLY, ad. *-lĭ*.

ARTOCARPACEÆ, *âr'tō-kâr-pā'sē-ē:* n. ord. of monochlamydeous exogens, of which the Bread-fruit (*Artocarpus incisa*) is the type; nearly allied to that of *Moraceæ* (mulberries, figs, etc.), and, like it, by many botanists regarded as a sub-order of *Urticaceæ* (nettles, etc.). The distinction be-

Bread-fruit (*A. incisa*).

tween Artocarpaceæ and Moraceæ lies chiefly in the straight embryo and large cotyledons of the former. The fruit is often a *sorosis* (a single succulent fruit formed of the aggregated ovaries of a whole head of flowers), as in Bread-fruit (q.v.). There are upwards of fifty known species,

natives exclusively of the tropics. The milky juice of some yields CAOUTCHOUC (q.v.); and that of a few species is so bland as to be used as a substitute for milk. See COW-TREE. The juice of others is, however, very poisonous, as that of *Antiaris toxicaria*, the Antjar poison, one of the poisons called Upas by the Javanese. The fruits are wholesome; the importance of the Bread-fruit in the South Sea Islands is well known; and the seeds of the *Musanga* of the Gold Coast of Africa, and of *Brosimum alicastrum* in the West Indies, are eaten as nuts. The fibrous bark of the Bread-fruit tree is made into cloth; its wood is used for building, its male catkins for tinder; its leaves serve as substitutes for table-cloths and wrapping-papers, and its milky juice for bird-lime. The bark of *Antiaris saccidora* is used in Western India for making sacks, which are formed by cutting a branch of the dimensions of the sack wanted, and simply turning back and drawing off the bark after it has been soaked and beaten, the wood being sawn off so as to leave a little portion to form the bottom of the sack. The fibrous bark of *Cecropia peltata*, or Trumpetwood, is used for cordage. The stem and branches are hollow, and are used for wind instruments. The wood of some species is valuable, such as *Letter-wood* (q.v.).

ARTOCARPUS, n. *ârʹtō-kârʹpŭs* [Gr. *artos*, bread; *karpos*, fruit]: the bread-fruit tree of the S. Sea Islands; the *Artocarʹpus incīsa*.

ARTOIS, *âr-twâʹ*: formerly a prov. of France, bounded by Flanders and Picardy, and almost corresponding with the modern department of *Pas-de-Calais* (q.v.). The cap. of A. was Arras. Louis IX., in 1239, made A. a county, and gave it to his brother Robert, who was succeeded by his son, Robert II., surnamed Posthumous, d. 1302. Afterwards it passed into the hands of Flanders and Burgundy, but was ceded to France by treaties in 1659 and '78. Charles X., in his early life, and also after his abdication, was known by the title of Count d'Artois.

ARTOTYRITE, n. *ârʹ-tō-tīʹrīt* [Gr. *artos*, bread; *turos*, cheese]: one of a sect in the primitive church who celebrated the Lord's Supper with bread and cheese, on the ground that the first oblations of men were not only the fruits of the earth, but their flocks (Gen. iv. 3, 4).

ARTS, DEGREES IN: ranks, or stages, in learning, gained by a student, and officially certified to by a proper collegiate or university faculty. The term 'Arts,' or 'Liberal Arts,' as technically applied to certain studies, came into use during the middle ages, and on the establishment of universities, the term 'Faculty of Arts' denoted those who devoted themselves to Science and Philosophy, as distinguished from the faculty of Theology, and afterwards of Medicine and Law. The number of 'Arts' embraced in the full mediæval course of learning was seven; Grammar, Logic, Rhetoric (constituting the *Trivium*), Music, Arithmetic, Geometry, and Rhetoric (the *Quadrivium*). The terms Master and Doctor were originally applied synonymously to any person engaged in teaching. In process of

time, the one was restricted to the liberal arts, the other to Divinity, Law, and Medicine. When regulations were established to prevent unqualified persons from teaching, and an initiatory stage of discipline was prescribed, these terms became significant of a certain rank, and of the possession of certain powers, and were called *gradus*, 'steps' or 'degrees.' The passing of the initiatory stage, said to have been instituted by Gregory IX. (1227–41), conferred the title of *bachelor* (q. v.), and an additional course of discipline and examination was necessary to obtaining that of *master*. The title of Master of Arts originally implied the right, and even the duty, of publicly teaching some of the branches included in the faculty of Arts; a custom which is still retained to some extent in the German universities, but has fallen into disuse in Britain, France, and America, where the title is nearly honorary. See DEGREE, LL.A. (Literate in Arts) is a minor degree, recently instituted at some of the Scottish universities, and at St. Andrew's is open to women. The degrees of Bachelor and Doctor of Science are granted for eminence in subjects some of which belong to the Faculty of Arts.

ART UNIONS: institutions for the promotion of public interest in fine art, and for providing opportunities for disposal by sale of the approved works of artists. They are intended to supply the place of that encouragement which, at an earlier period, artists received from princes and prelates.

The origin of A. U., claimed by the Germans, seems to belong to the French in the days of the first Napoleon. From France they passed over into Belgium, where they established themselves even in the less important towns, ten years before they were introduced into Germany. The Art Union of Mechlin dates from 1812; the Art Union (*Kunstverein*) of Munich, established 1823, became the model of most of those which afterward arose. The most important was established at Düsseldorf, 1829, for the Rhine provinces and Westphalia, and has promoted the execution of works of art of the highest class and placing paintings on a large scale in public buildings. The Bohemian Assoc. at Prague, and those of Berlin and Cologne have wrought zealously in the same high line—the latter urging on the completion of one of the greatest architectural monuments of northern Europe—the cathedral of Cologne. The establishment of permanent galleries of art in the cities to which they respectively belong is also one of the higher objects of A. U.—the first A. U. in Britain was established at Edinburgh 1834.

The American A. U., established in New York 1838, had close relations with the Düsseldorf Assoc., and rose in eleven years to an income of over $95,000, and a membership of 18,960. It was discontinued 1849, under the state laws prohibiting lotteries. The lottery is certainly an unfortunate feature in the plan of the A. U., appealing for a noble end to ignoble motives.

As regards the constitution of A. U., the following ar-

rangements are common to them all. Each member, in return for an annual contribution (in Britain, usually a guinea), receives an acknowledgment, which acts as his ticket in the lottery by which the works of art, purchased with the sum thus contributed, are distributed among the members. Generally, a fixed proportion of the contributions is retained and devoted to the preparation of an engraving, presented to those who have drawn blanks in the lottery. The engraving is usually executed by a local engraver, after a work of the local school intended to be patronized. The association further makes provision for an exhibition, either permanent, as at Munich, or annual, as in London, and Edinburgh, consisting mainly of the works of local artists, though most associations now admit those of strangers.

ARTVIN, *ârt-vēn:* town of Russian Armenia, on the Charuch; 34 m. s. of Batum. Pop. 8,000.

ARUM, n. *ā'rŭm* [L. *ārum;* Gr. *aron*, supposed to be anc. Egyptian word]: a genus of spadicifloral endogens belonging to the nat. ord. *Araceæ* or *Aroideæ*. This order comprises herbaceous plants, some of which are stemless; shrubby plants, some of which are arborescent; and plants which climb by aerial roots, clinging to the trees of tropical forests. The leaves are sheathing at the base, convolute in bud, usually with branching veins. The flowers are male and female, naked, arranged upon a *spadix*, which is generally enclosed in a *spathe* (q. v.): the male flowers at the upper part of the spadix, and the female flowers at its base. The ovary is free. The fruit is succulent, the seeds pulpy, the embryo in the axis of fleshy or mealy albumen, with a lateral cleft in which the plumule lies; the albumen, however, is wanting in some plants of the order.—As thus defined, this order contains almost 200 known species, natives chiefly of tropical countries; but some belong to colder climates. The N. Amer. representatives are Indian Turnip, Green Dragon, Arrow Arum, Water Arum, Skunk Cabbage, Golden Club, and Calamus.—The genus A. has a convolute spathe; the spadix naked at the point. In some species, a stench like that of carrion is produced during flowering, as well as a remarkable degree of heat. Plants are of course slightly warmer than the air around them, the heat being produced by the breaking up and oxidation of their protoplasm, and by the true respiration, in short, which goes on in all living tissues (see ANIMAL HEAT); but flowers, in general, are only 1°, or 1½°, warmer than the air, whereas the flowers of some of the Arums and nearly allied plants are sensibly warm to the touch, and that of *A. cordifolium* has been found to have a heat of 121° F., while that of the air was only 66° F.—The only British species is *A. maculatum*, CUCKOW-PINT or WAKE-ROBIN, which is abundant in England and in most parts of Europe, growing chiefly in moist shady woods and under hedges. It has a tuberous perennial root; its leaves are all radical, on long stalks, strongly arrow-shaped, often spotted; the spathe greenish yellow, inclosing a

rather short violet or brownish red spadix. It produces scarlet berries, 1-2 seeded, about the size of peas, clustered upon the spadix. The root has a burning acrid taste, which, however, it loses in drying or boiling. In a fresh state, it is a drastic purgative, too violent for medicinal use; indeed, it, as well as the leaves, is an active poison; yet a nourishing farina is prepared from it, after the acrid juice has been removed. This farina is a pure starch, and is known in England by the name of Portland Arrow-root. It was formerly prepared to a considerable extent in the isle of Portland, where also the tubers (corms) themselves are eaten by the country-people. A cosmetic called Cypress Powder is made from them in France, and they are used in Switzerland as a substitute for soap. They contain, indeed, a quantity of *Saponine*, to which their acridity is supposed to be owing. They lose great part of their acridity in drying, and were formerly used in medicine as a stimulant in impaired digestion, a diuretic in dropsies, and an expectorant in chest complaints. The plant is extensively cultivated in India for food.—*A. Indicum* is also much cultivated in Bengal for its esculent stems and small pendulous tubers.—Acridity in the juice, and the presence of an amylaceous substance of very nutritious quality, from which the acrid juice is easily separated, are characteristics of many plants of this order, particularly species of *Caladium* and *Colocasia*, much used for food in warm countries, under the names Cocco (q. v.) Eddoes, etc.—*Amorphophallus campanulatus* (*A. campanulatum*), called Ol by the Bengalese, is very much cultivated in some parts of India for its roots (flat underground corms) which form a very important article of food; yet in a fresh state it is so acrid that it is employed as an external stimulant, and is also used as an emmenagogue. Other species of *Amorphophallus* are still more powerfully stimulant.—Two large species of *Arisæma*, another genus very closely allied to A., were found by Dr. Hooker to afford food to the inhabitants of the Sikkim Himalaya at an elevation of upwards of 10,000 feet. Their tuberous roots are bruised by means of wooden pestles, and thrown into small pits with water, until the commencement of acetous fermentation, when the acridity is mostly dissipated; but the process is so imperfect that cases of injury from the poisonous juice are frequent. The tubers of *Arisæma atrorubens* (*A. triphyllum* of Linnæus), a native of the United States, and there known as Dragon-root and Indian Turnip, yield a pure white starch like that of *A. maculatum*. Their medicinal uses also are similar; they are employed as a stimulant of the secretions. The Dragon-plant, *A. Dracunculus*, a native of the s. of Europe, is not uncommon, in gardens in Britain, although it has a carrion-like smell and its emanations are apt to produce headache and other disagreeable effects. It has a singular appearance—straight stalks, three feet high, curiously spotted like the belly of a snake.—The peculiar acridity of the *Araceæ* is most remarkably displayed in the Dumb Cane (q. v.).

AR'UN: river rising in St. Leonard's Forest, in the middle of North Sussex, Eng.; and after a course of 35 m., falling into the English Channel. A canal unites it with the Wey, a feeder of the Thames.

ARUNDEL, *ăr'un-dĕl*: small town 5 m. inland from the mouth of the Arun, in a tertiary and chalk district, on the s. side of the South Downs, in the s.w. of Sussex. It consists mainly of a very steep street rising from the right bank of the Arun to the summit of a hill crowned by a castle. The Arun is navigable for vessels of 150 tons up to the town. Bark and timber are the chief exports. A. was disfanchised by the Reform Bill of 1867. It is governed by a mayor, four aldermen, and twelve councilors. The castle, from its site, is a striking object, and was built soon after the Norman conquest. It is an oblong, including 5½ acres within its walls. It was laid in ruins during the civil wars of Charles I., but, being the baronial residence of the dukes of Norfolk, the late duke restored it to its former Gothic magnificence. The keep, containing the dungeon, is a circular Norman tower of imposing strength. Pop. (1901), 2,738.

ARUNDEL, Thomas, Archbishop of Canterbury in the reigns of Richard II., Henry IV., and Henry V.: 1353–1413, Feb. 20; second son of Robert Fitz-Alan, Earl of Arundel and Warren. He was first Archdeacon of Taunton, and at the early age of twenty-one he was, by the pope's appointment, consecrated Bishop of Ely. In 1388, he was, by the same authority, transferred to the archiepiscopal see of York. He was also for some years lord high chancellor of England. Having been banished the kingdom for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richald II., he was honorably received at Rome, and by Pope Boniface IX. nominated Abp. of St. Andrews, with a promise of future preferment in England. In 1396 he was enthroned, with great pomp, Abp. of Canterbury. He was a bitter persecutor of the Lollards and followers of Wickliffe, and a chief instrument in procuring the horrible act for the burning of heretics (*De Hæretico Comburendo*), passed in the reign of Henry IV. He even carried his bigotry so far as to solicit from the pope a bull for digging up Wickliffe's bones, which was wisely refused him. He also procured a synodal constitution, which forbade the translation of the Scriptures into the vulgar tongue. Among others whom he caused to be convicted of heresy, and sentenced to the flames, was Lord Cobham, one of the principal patrons of the new sect, at the commencement of the reign of Henry V. Soon after, A. was seized with an inflammation in the throat, from which he died.

ARUNDELIAN, a. *ăr'ŭn-dēl'yăn* [from the Earl of *Arundel*]: a name applied to certain ancient marbles presented by him to the University of Oxford.

ARUNDEL MARBLES: part of a collection of ancient sculptures, formed about the beginning of the 17th c. by

Thomas Howard, Earl of Arundel, and presented, 1667, to the Univ. of Oxford, by his grandson, Henry Howard, afterwards Duke of Norfolk. The principal portion of it is the 'Parian Chronicle,' consisting of the fragments of an inscription in marble, supposed to have been executed in the island of Paros, about B.C. 263. In its perfect state, this inscription contained a chronological table of the principal events in Grecian history from the time of Cecrops (B.C. 1582), to the archonship of Diognetus (B.C. 264) The chronicle of the last 19 years is lost, and the extant portion of the inscription is much corroded and defaced. This curious and interesting monument, the authenticity of which has been questioned and maintained with almost equal ingenuity and learning, was purchased for the Earl of Arundel, with many other relics of antiquity, at Smyrna, by Mr. (afterwards Sir William) Petty. The inscription, and all the other principal sculptures in the Oxford Collection, are to be found fully illustrated in the relative publications of Selden, Prideaux, Maittaire, and Chandler, under the various titles of *Marmora Arundelliana* and *M. Oxoniensia.*

ARUNDINACEOUS, a. *ă-rŭn'dĭ-nā'shŭs* [L. *arundo*, a reed]: resembling or having the structure of reeds. ARUNDINEOUS, a. *ăr'ŭn-dĭn'ĭ-ŭs*, abounding with reeds. ARUNDIFEROUS, a. [L. *arundo*, a reed; *fero*, to bear]: reed-bearing; cane-bearing.

ARUN'DO: see REED.

ARUSPICE, n. *ă-rŭs'pĭs*, or ARUSPEX, n. *a-rŭs'peks* [L. *arus'pex* or *harus'pex*, a soothsayer—from *hīra*, the intestine; *spĕcĭō*, I behold]: in *anc. Rome*, a diviner by the inspection of the entrails of beasts. ARUSPICY, n. *ă-rŭs'pĭ-sĭ*, the art of foretelling events by the inspection of the entrails of beasts slain in sacrifice.

ARVIC'OLA : see VOLE.

ARVONIAN, a. *âr-vō'nĭ-an* [from *Arvonia*, the Roman name of a district of Wales]: pertaining to Arvania. In *geol.*, the A. is a Pre-Cambrian formation found in Pembrokeshire, Carnarvonshire, and Anglesea.

ARYAN, a. *âr'yăn* or *âr'ĭ-ăn* [Sans. *arya*, noble, of a good family: connected with *ar* in L. *arārĕ*, to plow, and perhaps with Gael. *ghrian*, proud; *Arii*, a tribe of High Asia, mentioned in Herodotus]: name applied to the Indo-European or Indo-Germanic race, and to their languages. As applied to a race it includes a family of nations, consisting of two branches, geographically separated, an eastern and a western. The western branch comprehends the inhabitants of Europe, and their descendants in America and elsewhere, with the exception of the Turks, the Magyars of Hungary, and the Finns of Lapland (see EUROPE); the eastern comprehends the inhabitants of Armenia, of Persia, of Afghanistan, and of Northern Hindustan. See HINDUSTAN. The evidence on which a family relation has been established among these nations is that

of language. Between Sanskrit (the mother of the modern Hindu dialects of Hindustan), Zend (the language of the ancient Persians), Greek (which is yet the language of Greece), Latin (the language of the Romans, and the mother of the modern Romanic languages, i.e., Italian, French, Spanish, Portuguese, Wallachian), Celtic (once the language of great part of Europe, now confined to Wales and parts of France, Ireland, and Scotland), Gothic (which may be taken as the ancient type of the Teutonic or Germanic languages—including English—and of the Scandinavian), and Slavonic (spoken in a variety of dialects all over European Russia and a great part of Austria), the researches of philology have within the present century established such affinities as can be accounted for only by supposing that the nations speaking them had a common origin. No one of these nations, whether existing or historical, can claim to be the parent nation of which the others are colonies. The relation among the languages mentioned is that of sisters—daughters of one mother, which perished, as it were, in giving them birth. No monuments of this mother-language have been preserved, nor have we any history or even tradition of the nation that spoke it. That such a people existed and spoke such a tongue is an inference of comparative philology, the process of reasoning being analogous to that followed in the kindred science of geology. The geologist, interpreting the inscriptions written by the finger of Nature upon the rock-tablets of the earth's strata, carries us back myriads of ages before man appeared on the scene at all, and enables us almost to see one formation laid above another, and one plant or animal succeed another. Now languages are to the ethnologist what strata are in geology; dead languages have been well called his fossils and petrifactions. By skilful interpretation of their indications, aided by the light of all other available monuments, he is able to spell out, with more or less probability, the ethnical records of the past, and thus obtain a glimpse here and there into the gray cloud that rests over the dawn of the ages.

When these linguistic monuments are consulted as to the primitive seat of the Aryan nations, they point, as almost all ethnologists are agreed, to Central Asia, somewhere probably e. of the Caspian, and n. of the Hindo Kush and Paropamisan Mountains. There, at a period long previous to all European history—while Europe was perhaps only a jungle, or, if inhabited at all, inhabited by tribes akin to the Finns, or perhaps to the American Indians—dwelt that mother-nation of which we have spoken. From this centre, in obedience to a law of movement which has continued to act through all history, successive migrations took place towards the n. w. The first swarm formed the Celts, who seem at one time to have occupied a great part of Europe; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic peoples. All these seem to have made their way to their new settlements through Persia and Asia Minor, crossing

into Europe by the Hellespont, and partly, perhaps, between the Caspian and the Black Sea. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Caspian. At a period subsequent to the last n.w. migration, the remnant of the primitive stock seems to have broken up; part poured southwards through the passes of the Himalaya and Hindu Kush into the Punjab, and became the dominant race in the valley of the Ganges; while the rest settled in Persia, and became the Medes and Persians of history.

It is from these eastern members that the whole family takes its name. In the most ancient Sanskrit writings (the Veda), the Hindus style themselves Aryans; and the name is preserved in the classic Arii, a tribe of ancient Persia, Aria, the modern Herat, and Ariana, the district Ariana, or Airyana, is evidently an old Persian word, preserved in the modern native name of Persia, Airan or Iran. *Arya*, in Sanskrit, signifies 'excellent,' 'honorable,' being allied to the Greek *ari*(stos), the best; or to the root *ar* (Lat. *arare*, to plow), distinguishing tillers (*earers*) of the earth from the nomadic Turanians. French savans limit the word *Aryan* to the eastern section of the Indo-European stock.

It should be mentioned that Latham's theory of the European origin of the Aryans was supported by Spiegel, Benfey, and others. Some of the European languages would therefore be a truer representation of the original Aryan tongue than the Indic ones. The original home of the Aryan would be Scandinavia, or the neighborhood of the Baltic; and the Aryan himself, a coarse nomad, without metals, clothed in skins. Following the other view, Max Müller has drawn a picture of the Aryan family while yet one and undivided, in which the state of thought, language, religion, and civilization is exhibited in a multitude of details. Where the same name for an object or notion is found used by the widely spread members of the family, it is justly inferred that that object or notion must have been familiar to them while yet resident together in the paternal home. It is in this way established, that among the primitive Aryans not only were the natural and primary family relations of father, mother, son, daughter, hallowed, but even the more conventional affinities of father-in-law, mother-in-law, sister-in-law; that to the organized family life there was superadded a state organization with rulers or kings; that the ox and the cow constituted the chief riches and means of subsistence; and that houses and towns were built.

ARYTENOID, a. *a-rĭt-ē'noyd* [Gr. *arutai'na*, a pitcher; *eidos*, resemblance]: resembling the mouth of a pitcher; in *anat.*, applied to two small cartilages at the opening of the larynx to which the vocal chords are attached.

AS, conj. prep. or ad. *ăz* [contr. of AS. *eallswa*, all so: Ger. *als*]: signifying agreement in manner in general; likeness of manner; for example: equally.

AS, rel. pron. *ăz* [Icel. *es:* mod. Icel. *er*, rel. pron., as]: in old and common Prov. Eng., a relative pronoun used instead of *who*, *which*, and *that*, as 'bring the box *as* stands at the fire-place'; 'he had a daughter *as* was named Hannah': see Skeat.

AS, n. *ăs* [L.]: the designation both of a Roman weight (called also *libra*) corresponding very nearly to an English *pound* (q. v.), and of a coin made of the mixed metal *aes*, or bronze. The As (coin) originally no doubt weighed a (Roman) pound; but it was gradually reduced to $\frac{1}{96}$ of a pound, and even lower. It is thus difficult to assign any fixed value to the As. About B.C. 270, the denarius (abt. 17 cents) contained 10 *ases*; so that the value of the As was then a little less than 2 cents; when 16 ases went to the denarius, the value was about a cent. It was by the *sestertius* (q. v.) that money was reckoned at Rome. The oldest form of As usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived.

A'SA, third king of Judah; (reigned B.C. 955–914); son of Abijah, and grandson of Jeroboam. At the beginning of his reign, he was very young, and his character apparently undeveloped, for he allowed his grandmother, Maacah, to encourage idolatry; but on assuming the government, one of his earliest acts was to remove her from all authority 'because she had made an abominable image for an Asherah' (1 Kings, xv. 13; 2 Chron. xv. 16). His zealous efforts to extirpate the vices and impieties of the people were on the whole successful. He took away the Sodomites out of the land, and the altars of the strange gods, broke the images, and cut down the groves. For the next ten years he devoted himself to strengthening the defenses of his kingdom, and organized a magnificent army of more than half a million, which seems to have been looked upon as a menace by other monarchs, for one of these, Zerah the Cushite, took the initiative, and penetrating through *Arabia Petræa*, invaded Judah, but was defeated with immense slaughter. Before the battle commenced, Asa had invoked the aid of Jehovah; and some time after the victory, he and all his people entered into a solemn covenant 'to seek the Lord God of their father with all their heart and with all their soul' (2 Chron. xv. 12). Peace lasted for twenty years in the kingdom, but in the 35th year of Asa's reign, war again broke out between him and Baasha, king of Israel. He sought and obtained the aid of the Syrian monarch, Benhadad; but at the expense of 'the treasures of the house of Jehovah,' and although successful against his adversary, he was indignantly upbraided and threatened by the prophet Hanani for not relying on Jehovah alone. Asa, flushed with success, threw the prophet into prison, and, it would appear, 'in his rage' oppressed some of the people at the same time—perhaps those only who sided with Hanani, for we

know that at his death the nation honored him with a splendid funeral; and the sacred historian pays the highest tribute to his memory, declaring that 'Asa's heart was perfect with the Lord all his days.'

ASA DULCIS, *ăs'ă dŭl'sĭs* [i. e., Sweet Asa]: a drug in high repute among the ancients as an antispasmodic, deobstruent, and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *Laser Cyrenaicum.* The plant is of the genus *Thapsia* (of the natural order *Umbelliferæ*), either *T. Garganica*, or a nearly allied species, *T. Silphium*—perhaps the drug was produced by both. They are natives of the s. of Europe and of Barbary, and appear to be very active purgatives.

ASAFETIDA, or Assafœtida, n. *ăs'ă-fĕt'ĭ-dă* [L. *asa*, a gum; *fœtĭdus*, fetid: Ar. *asâ*, healing]: a gum-resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians; but which, perhaps, was the *Asa dulcis.* It name is perhaps derived from the Persian word *asa*, which means *mastic.* It is obtained from the root of *Ferula fœtida.* Although the United States pharmacopœia limits the producing plant, it is quite probable that asafœtida is obtained from two or even three or four species of *Ferula, F. narthex, F. fœtidissima, F. jaschkeanum.* The main sources, however, are *F. fœtida* and *F. narthex.* These are coarse herbs of the *Umbelliferæ* family distributed throughout the eastern Asiatic provinces from Persia, Turkestan, Afghanistan.

A. is prepared in the dry southern provinces of Persia, but chiefly in Khorassan and Afghanistan, and also to the n. of the Hindu Kush range of mountains. About April, the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After six weeks, a slice is cut horizontally from its summit, and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes brought to the market in the form of tears, but more frequently in lumps made up of irregularly shaped tears, agglutinated together by a softer substance. A. is extensively used in medicine, and has stimulant and anti-spasmodic properties. When taken internally is undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. According to the analysis of Pelletier, A. is composed of the following substances: resin, 65 parts; volatile oil, 3.6; gum, 19.44; bassorin, 11.66; various salts, .30. In many parts of the East, this drug is used as a condiment, in which respect it seems to take the place of the garlic of some European nations.

ASAPHES, n. *ăs'ă-fēz* [Gr. *asăphēs*, dim, indistinct]: genus of Ichneumons, of which the best-known species, A. *vulgaris*, deposits its eggs in aphides, on which the larvæ, when hatched, prey.

ASAPH, ST., *sānt az'af:* cathedral city, a station on the Vale of Clwyd railway; on a small hill between the rivers Clwyd and Elwy, in the n. of Flintshire, Wales. The cathedral, on top of the hill on which the city is built, is cruciform, 178 ft. by 68 ft., with a tower 93 ft. high; one of the smallest of British cathedrals. It was built, 1284, on the side of a wooden structure founded before 596. Kentigern, or St. Mungo, Bishop of Glasgow, and his disciple St. A., are said to have founded the see of St. A. in the 6th c. St. A., with the Flint district of boroughs, returns one member to parliament. Pop. of St. A. (1901) 16,732.

ASAPHUS, n. *ās'ă-fŭs* [Gr. *asăphēs*, obscure]: in *geol.*, a genus of trilobites, so named from the obscurity resting on their true nature, being at first confounded with insects. See TRILOBITE.

ASARABACCA, n. *ăs'ăr-ă-băk'ă* [L. *asărum*, wild spikenard; *barca*, a berry]: *Asarum Europæum:* plant of the nat. ord. *Aristolochiaceæ* (see ARISTOLOCHIA); native of Europe, growing in woods; rare, perhaps not truly indigenous, in Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of A., however, as an emetic has been much superseded by that of ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil, and a crystalline substance called ASARINE, *âs'ăr-ĭn*, or ASARONE, to which it seems to owe its active properties. The genus *Asarum* is distinguished by twelve horned stamens, distinct from each other and from the style, and by a bell-shaped three-lobed perianth. A. *Europæum* has a very short stem with two shining kidney-shaped leaves on long stalks, from the axil of which springs a single drooping greenish-brown flower. A nearly allied species, A. *Canadense*, a native of N. Amer. is stimulant and diaphoretic and is used under the name of CANADA SNAKE-ROOT, instead of *Aristolochia Serpentaria*. It is also called WILD GINGER, and used as a spice, being of a warm aromatic quality, and not acrid, like its European congener.—Two other species, Va. and south.

ASARUM: see ASARABACCA.

ASBEFERRITE, n. *ăz-bĕ-fĕr'rīt* [Ger. *asbestos*, inextinguishable: L. *ferrum*, iron]: a grayish-white, or ash-gray mineral, a variety of amphibole. Dana classes A. with dannemorite under the head 'Iron-Manganese Amphibole.'

ASBEN, *âs-bĕn'*, or A'ĪR: see AIR.

ASBESTOS, n. *ăs-bĕs'tŏs*, or ASBES'TUS [Gr. *asbestos*, un-

quenchable]: a fibrous mineral of the hornblende family, having the fibres elastic and flexible, somewhat resembling flax, and which cannot be consumed by fire; the different varieties receive the names of *rock-wood, rock-cork, mountain-leather, fossil paper* or *flax*, etc. ASBESTINE, *ăs-bĕs-tĭn*, of or like asbestos. ASBES'TIFORM, a. *-tĭ-fawrm* [L. *forma*, shape]; assuming the fibrous character of asbestos; like asbestos. ASBESTIC, a. *ăs-bes'tik*, pertaining to asbestos; made of asbestos. ASBESTOID, n. a mineral resembling asbestos in form; called also byssolite: ADJ. of the form of asbestos; fibrous.

ASBESTOS, *ăs-bĕs'tŏs*, or ASBES'TUS, *-tŭs:* mineral substance, var. of amphibole (when not fibrous serpentine), akin to hornblende, actinolite, and tremolite; like these, it consists chiefly of silica, magnesia, alumina, and ferrous oxide; but there are wide differences between specimens. A. consists of crystalline elastic fibres, of silky lustre, and varying in color from white to gray or green. Woven into cloth, it forms a fireproof texture. The most prized variety of A. is *Amianthus*, with fibres snowy white, long, and flexible; it occurs abundantly in Canada. The inferior qualities have shorter and less flexible fibres, and usually are of dark color; besides, they are of greater specific gravity; they are known as *common asbestos, mountain leather*, and *mountain wood*. The long-fibred A. is spun into threads, which are woven into fabric used for filter linings and for lagging in steam-boilers. The threads are used also for stuffing steam-pipe joints, and a large rope of them serves for piston-packing. Paper has been made of A., and would prove invaluable, in case of fire, for charters and other important documents, were it not that the writing disappears when the material has been subjected to a red heat. Patents have been granted in the United States upon methods of using A. for fire-brick and crucibles, as an absorbent in lamps and carburetters, as a boiler-covering, etc.; also as a material for coffins: instead of coffins made all of asbestos, it is usual now merely to line a wooden shell with A. paper. Roofing materials of A. consist of a roof-coating and a cement for repairing metal roofs. An A. felt is manufactured for use wherever steam-pipes, boilers, furnaces, etc., need to be confined to prevent radiation.

ASBJORNSEN, PETER CHRISTEN: 1812, June 15—1885, Jan. 6; b. Christiania, Norway: distinguished author. He studied at the university, and, 1858, was appointed superintendent of forests. His official duties gave him opportunity for collecting the popular tales of the peasantry; and he is known for his great collection of *Norwegian Folk-tales* (1842, extended with the help of J. Moe), and his *Norwegian Fairy Tales and Folklore* (1845; 3d ed. 1870).

ASBOLINE, *ăs'bō-lĭn* [Gr. *asbolos*, soot]: in *chem.*, a yellow, oily substance, very acrid and bitter, obtained from soot.

ASBOLITE, n. *ăz'bŏl-īt,* or ASBOLAN, *ăz'bŏl-ăn* [Gr. *asbolainō,* to cover with soot]: called also earthy cobalt. Dana makes it a variety of wad, and considers it to be that mineral combined with oxide of cobalt.

ASBURY, *ăs'bėr-ĭ,* FRANCIS: 1745–1816; b. Staffordshire, Eng.: ordained, 1784, the first bishop of the Meth. Epis. Church in the United States. Apprenticed to a mechanic in 1759, in Staffordshire, the preaching of an itinerant Meth. preacher turned his mind to religion, and two years later, at the age of 16, he began to preach in his own neighborhood. He became an itinerant, 1767, preached for three years in England, and was sent, 1771, as a missionary to America. John Wesley appointed him general assistant for this country. In his new and responsible position, A. soon infused fresh vigor into the cause in America, dispatching missionaries all over the country, organizing new societies, and preaching with great force and eloquence. He remained in the colonies during the Revolutionary war, showing great discretion. In 1784, it was determined to establish an independent Meth. Epis. Church in America, and A. was made joint superintendent with Thomas Coke, who had been ordained by Mr. Wesley. In the following year the first Meth. college in America was founded. A. was a passable Greek and Hebrew scholar, though without a university education. He never married, from a determination to devote himself to his great work. The statistics of his professional career are remarkable: he is said to have travelled over 270,000 m., presided at 224 conferences, ordained more than 4,000 ministers, and preached more than 16,000 sermons. He left three vols. of his 'Journals,' which are highly esteemed.

ASBURY PARK, *ăz'bĕr-ĭ:* post-village in Ocean tp., Monmouth co., on the Atlantic Ocean, N. J., 6 m. s. of Long Branch; 51 m. from New York. It is a favorite summer resort, covering abt. 500 acres, handsomely laid out, with a public hall, free reading-room, and other advantages. It contains a number of large hotels and numerous boarding houses, and the drives in the vicinity are attractive. Between Asbury Park and Ocean Grove is Wesley Lake, about three quarters of a m. long, a beautiful sheet of water devoted to boating. Pop. (1900) 4,148; summer visitors number above 25,000.

ASCALAPHUS, n. *ăs-kăl'ă-fŭs* [Gr. *askalaphos,* a word in Aristotle, apparently meaning a kind of owl]: genus of neuropterous insects belonging to the family *Myrmeleontidæ,* or Ant-lions. They differ from the Myrmeleon proper in having much longer antennæ and shorter bodies, while their larvæ do not construct a pitfall.

ASʹCALON, or ASHʹKELON: ruined city of Palestine, on the shore of the Mediterranean, 36 m. w.s.w. of Jerusalem. Its name occurs often in the Old Testament. It was in ancient times a fortified city, and the principal town of one of the five lordships of the Philistines. Herod the Great embellished it with baths, palaces, and fountains; but it suffered in the wars with the Romans. There was a celebrated temple of Derketo, the Venus of the Syrians, at A. After continuing long under the dominion of the Roman empire, the city came into the possession of the Saracens in the 7th c. In 1099, a great battle was fought on the plains of A., between the Crusaders and Saracens, when the Christians gained a decisive victory. The city, however, a number of years after, was recaptured by the Moslems, and held by them as a strongly fortified place until 1153, when it was taken by the Crusaders under Baldwin III. In 1187, it was retaken by the Saracens, but afterwards (1192) fell into the hands of Richard Cœur de Lion. Subsequently, being more than once dismantled and repaired during the wars between Richard and Saladin, it was reduced to desolation by Sultan Bibars in 1270.

The ruins of this ancient city occupy an extensive semicircular eminence, sloping gently to the e., but abrupt and steep towards the sea. Part of the walls are still standing, with the remains of Gothic churches, a palace, and several edifices or more ancient date, which attract the notice of the traveller and the antiquary.

ASCANIUS, *ăs-kāʹnĭ-ŭs*, also called IULUS: according to Virgil and Livy, the son of Æneas and Creusa, and founder of Alba Longa. One tradition says he succeeded his father as king of the Latins. The Julia gens of Rome claimed him as an ancestor.

ASCAPART, *ăsʹkā pârt:* a giant 30 ft. high, said to have been conquered by Sir Bevis of Hampton, whom with his wife and horse, A. carried under his arm. He is represented on the city gates of Southampton, Eng. Shakespeare, Pope, and others allude to him.

ASCARIDES, n. plu. *ăs-kărʹĭ-dēz*, sing. AS'CARIS [Gr. *askăris*, a long round worm in the bowels]: the small intestinal thread-worms, formerly called Ascaris vermicularis, but now referred to the genus *Oxyuris* (q.v.).

ASCARIS, *ăs'kă-rĭs:* genus of *Entozoa,* or intestinal worms, of the ord. *Nematoidea* of Cuvier and others. The ascarides have a body approaching to cylindrical, but thickest in the middle. They inhabit the intestines of animals. The species are numerous. One of the best known is *A. lumbricoides,* often called the common round worm, which occurs in the intestines of man and of some of the lower animals, as the hog, ox, horse, etc., and which often occasions severe disease, and sometimes death, particularly when it ascends from the intestines to the stomach. Its presence even in its most ordinary situation in the small intestines is attended with unfavorable effects upon the general health; and the greater the number present—which, however, is not usually large—the greater, of course, is the injury; although when they remain in the intestines, worms of this species are less injurious and less annoying than other and even much smaller intestinal worms. In subjects otherwise diseased, they occasionally find their way out of the intestines into the closed serous cavities of the body, and even pass through ulcerated parts of the external integument; but the mouth is formed only for suction, and is provided with no means of boring through the healthy intestine. A number of remedies (anthelmintics) have been proposed and used to expel this parasite. They are of two classes: (1) those that kill the worms (vermicides) and (2) those that simply cause their expulsion (vermifuges).

The A. *lumbricoides* is ordinarily, in size and appearance, much like the Common Earthworm (Lumbricus terrestris), from which resemblance it has received its specific name, although the resemblance is rather in general form than in more essential characteristics. It has been seen fifteen inches in length. Its mouth consists of three fleshy tubercles, which can be spread out upon the intestines to form a broad circular sucker, and within which there is a small tube capable of being protruded. The alimentary canal consists of a muscular gullet and stomach, and a thin-walled intestine. Between the muscular layers of the body is produced a pale reddish oily matter, with a strong and very peculiar odor. The males are smaller than the females, and much more rare. The females produce eggs in great numbers; but it is uncertain if ever developed within the intestine in which the parent worm resides. They are developed outside of the body, but the young remain encysted in the shell until again received into the intestinal canal, probably in salads and other raw vegetable food, where they develop into mature worms.

A. *vermicularis* (thread-worm) is another worm formerly regarded as a species of this genus but now referred to another genus of the *Ascaridæ,* namely, *Oxyuris.*

ASCELLI: see Ascus.

ASCEND, v. *ăs'sĕnd'* [L. *ascend'ĕrĕ,* to ascend—from *ad,* to; *scando,* I mount up; *scansus,* mounted up: It. *ascendere*]:

to mount up; to go up; to rise. ASCEND'ING, imp.: ADJ. in *bot.*, rising erect from the ground and forming a curve; applied to ovules attached a little above the base of the ovary. ASCEND'ED, pp. ASCENDABLE, a. *ăs-sĕnd'ă-bl*, that may be ascended. ASCEND'ANT, a. superior; surpassing; in *astron.*, above the horizon: N. commanding influence; superiority. ASCENDENCY, n. *ăs-sĕnd'ĕn-sĭ*, power; controlling influence. ASCENSIVE, a. *ăs-sĕn'sĭv* [L. *ascensus*, mounted up]: rising or tending to rise. ASCENSION, n. *ăs-sĕn'shŭn*, the act of going up. ASCENSIONAL, a. *-ăl*, pertaining or relating to. ASCENT, n. *ăs-sĕnt'*, act of rising; rising of a hill; an eminence. RIGHT ASCENSION, in *astron.*, the arc of the equinoctial intercepted between the first point of Aries and the circle of declination passing through the place of the heavenly body. ASCEN'SION-DAY, n. the day on which our Lord's ascension is commemorated. —SYN. of 'ascend': to mount; arise; rise; climb; scale; tower; soar;—of 'ascendency': influence; sway; prevalence; domination; control; authority; dominion.

ASCENSION, *ăs-sĕn'shŭn:* one of the comparatively few single islands on the globe, being about 800 m. n.w. of St. Helena, and almost as far to the s.s.w. of St. Matthew. It is said to have received its name from its discovery by a Spanish navigator on Ascension-day. It is nearly in the middle of the South Atlantic, the lat. of its fort being 7° 55′ 55″ s., and its long. 14° 25′ 5″ w. Area, about 35 sq. m. Though discovered as early as 1501, yet it remained uninhabited till 1815, when, in connection with Napoleon Bonaparte's detention in St. Helena, the English took possession of it. It is now used as a naval victualling-station and hospital. Like St. Helena, it is of volcanic origin, and generally mountainous—one peak rising to a height of 2,870 ft. From the extreme dryness of the climate, which, however, is healthful, the surface is nearly destitute of verdure. Among indigenous productions are the tomato, castor-oil plant, and pepper; European vegetables are cultivated. It is noted for its turtle which sometimes weigh as much as 800 lbs. Pop. (1901)165, 15 being residents on the island, and 12 being in the Royal Naval Hospital.

ASCENSION, RIGHT [Ger. *gerade aufsteigung*]: in *astron.* one of the arcs which determine the position relatively to the equator of a heavenly body on the celestial sphere, the other arc being the declination. See ARMILLARY SPHERE (under ARMILLA). It is the arc of the equator intercepted between the first point of Aries (q.v.), and the point at which the circle of declination passing through the star cuts the equator. Measured always from w. to e., right A. on the heavens corresponds to longitude on the earth. The right A. of a heavenly body is ascertained by means of the transit instrument and clock. The transit instrument determines its meridian passage, and the transit clock gives the time at which it takes place. When the first point of Aries is in the meridian, the

clock stands at 0 hours, 0 minutes, 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock, therefore, at the passage of any heavenly body gives its right A. in time, and this, when multiplied by 15, gives the same in degrees, minutes, and seconds. The right A. is usually given, however, in time. The old term, *oblique* A., was given to the right A. of the point of the equator that rose simultaneously with the heavenly body; and the difference of the oblique and right A. was called the 'ascensional difference.'

ASCEN'SION-DAY, or HOLY THURSDAY: day on which Christ's ascension is commemorated; one of the great religious festivals of the Christian Church, traceable from about the middle of the 4th c. It occurs on the fortieth day after Easter (Acts, i. 3). Connected with the religious observances of this day were certain civic ones; which in some parts of England and Scotland are continued to this day—viz., *beating the bounds, or riding the marches*—though their religious connection is apparently forgotten. See ROGATION DAYS: PERAMBULATION.

ASCERTAIN, v. *ăs'sėr-tān'* [OF. *acertainer*—from L. *ad:* F. *certain*, certain—from L. *ad*, to; *certus*, sure]: to make certain; to make sure by examination; to establish. AS'CERTAIN'ING, imp. AS'CERTAINED', pp. *-tānd'*. ASCERTAINABLE, a. *ăs'sėr-tān'ă-bl*, that may be made sure of by search or examination. ASCERTAINMENT, n. *ăs'sėr-tān'-mĕnt*, establishment; discovery. AS'CERTAIN'ER, n. one who.

ASCETIC, n. *ăs-sĕt'ĭk* [Gr. *askētĭkos*, relating to the practice of anything; *askētos*, exercised, practiced; *askēsis*, the discipline practiced by the wrestlers]: one unduly rigid or austere; one who retires from the world: ADJ. retired from the world; austere; also ASCET'ICAL, a. *-ĭ-kăl*. ASCET'ICS, n. *-ĭks*, a treatise on the subject of asceticism or giving rules to be observed by ascetics. ASCETICISM, n. *ăs-set'ĭ-sĭzm*, the practice of ascetics. Among the Greeks, *askēsis* denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion and to avoid all sensual and effeminating indulgences. In the schools of the Greek philosophers, especially of the Stoics, the word which signified the discipline practiced by the wrestlers, signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The language of the Apostle Paul in comparing the Christians to wrestlers who had to contend with Satan, the world, and the flesh, contributed to this. But the philosophy of the time had more to do with it, which held the freeing of mind from matter to be the means of union with God; or, at least, that the refraining from all luxurious pleasure was the way to restore the soul to its original purity. To understand the vast influence that ascetic ideas have exercised on the Christian religion, we must look beyond the bounds of the Christian history.

Their root lies in the oriental notion, that the Absolute or All is the only real existence; and that individual phenomena, especially matter in all its shapes, are really nothing, and are to be despised and avoided, as involving the principle of separation from the Absolute. The East, accordingly, is the native soil of A. The glowing imagination of the oriental carries the practice of it to a monstrous extravagance, as is seen in the frightful self-tortures inflicted by the yogins (see YOGA) and fakirs (see FAKIR), the suicides in the sacred Ganges and otherwise, and the practices recently prevalent of offering children in sacrifice, and of burning widows; most of which, however, have been suppressed by the British government. Buddhism, which may be considered as a kind of puritan revival or reformation—the Methodism of the Indian religion—carried the principle beyond its previous bounds. In its contemning the world; in its inculcating a life of solitude and beggary, mortification of the body, and abstinence from all uncleanness and from all exciting drinks, the object was to keep as distant and detached as possible from this 'Vale of Sorrow.' See BUDDHISM and NIRVANA. The sober Chinese, and the more moral and rational Persians, never carried asceticism to these extravagances; and the earnest Egyptians sought to confine it to monogamy of the priests, abstaining from the flesh of swine and from beans, rigid purity, circumcision, moderate flagellation, and frequent contemplation of death (for which there were remembrancers provided, even in the midst of festivities). These are certainly milder forms of A., but the principle is the same.

It is in the light of this fore-history that we must consider Judiac and Christian asceticism. In the oriental mind, especially in Egypt, circumcision, avoiding of all uncleanness, and fasting, were signs of humiliation before God; and in the Mosaic ritual they were conditions of the favor of the holy Jehovah. Voluntary vows, abstaining even from lawful food, wine, etc., were held to have a special purifying, consecrating efficacy, particularly for prohpets and men of special callings. But self-castigation was foreign to the sobriety of Judaism, and even hermitism came into established practice only shortly before Christ, in Palestine among the Essenes (q.v.), in Egypt among the Therepeutæ (q.v.), though doubtless Jewish A. had become more stern and gloomy since the exile in Babylon.

A. was far less congenial to the reflective nations of the West, above all to the cheerful Greeks. A Greek felt himself entitled to enjoyment as well as his gods; hence Greek religious festivals were pervaded by cheerfulness. The only exception appears to be the Eleusinian mysteries, which never took hold of the people generally, and the passing phenomenon of the Pythagorean fraternity. The attack made by the Platonic school upon the body as the prison of the soul—a view reminding one of the East—and the extravagant contempt for the elegances, and even decencies, of life professed by the later Stoics and Cynics,

where no genuine fruits of the popular Greek mind; and we must also ascribe to the infusion of oriental philosophy the ascetic tendencies of Neoplatonism, in holding abstinence from flesh and from marriage as chief conditions of absorption into the divinity.

It was into the midst of these ideas that Christianity was introduced. The Jewish converts brought with them their convictions about fasting. Fasting and Nazaritic observances were thought sanctifying preparatives for great undertakings; and the inculcation of abstinence from marriage, on the ground of the expected speedy reappearance of Christ, falls in with the same notion, namely, that the flesh, that is, the sensuous part of our nature, is the seat of sin, and must therefore, first of all, be rigorously chained. The oriental traditions of A.; the spirituality of Christianity, pointing away from earth to heaven; opposition to the corruption of the heathen world; the distinction made between belief and knowledge, as a higher and lower stage of intelligence, leading to a corresponding distinction of a higher and lower stage of virtue,—all combined to make the Christians of the first two centuries hold aloof from the world and its wisdom, and favor abstinence from marriage, more especially on the part of the clergy. This ascetic spirit began as early as the commencement of the 2d c. to court trial in the perilous practice of men and women living together under vows of continence. We find Cyprian dissuading from the dangerous experiment and even the authority of the church interposed to the same effect. But during the first three centuries no irrevocable vows yet bound the devotees to a lifelong A. Fasting was also comparatively rare.

But the tendency to outward manifestations began to grow stronger. The inward and spiritual life of the Christians had greatly declined; and if the previous bloody persecutions had driven individuals from human society into the deserts, the growing secularization of the church, after Christianity became the state religion, had the same effect to a still greater degree. All this paved the way for the chief manifestations of A.—namely, monasticism, which the church deemed herself compelled by the overwhelming tide of opinion within and without to recognize, and take under her charge. See MONACHISM. From the African Church, represented by Tertullian and Augustine, a spirit of gloomy and crushing supernaturalism spread deeper and deeper over the Western Church generally intensifying the ascetic tendencies, and leading to still more marked separation from a despised world. There were not wanting healthier minds—as Jovianus, Vigilantius, and others—to raise their voices against fasting, monkery, and the outward works of A. generally; but such protests were vain, and became more rare.

From the 11th c., the Cathari, Waldenses, and other sects, though themselves ascetics in some sense, yet assailed the external A. of the church; the classic Petrarch fought on the same side; and so did Wickliffe, Huss, and Jerome

of Prague, in their premature struggle at reformation. After a preliminary skirmish by Erasmus, the struggle was decided in the reformation of the 16th c. The fundamental principle of that movement, that salvation is secured by justification through faiths, and not through dead works, struck at the root of monkery and mortification in general. But the victory has not been so complete as is often assumed. The ascetic spirit often shows itself still alive under various disguises even in Protestantism. The Mennonites inculcated a rigid A.; and with the Shakers of America, celibacy is practiced as a virtue. The essence of A. is to hold bodily self-denials and suffering to be meritorious in the sight of God, in and for themselves, without regard to their promoting the good of others or their improving the individual's own character. In this light, some traits presented by the earlier Puritanism, Methodism, and Quakerism, may appear ascetic. It is not impossible that vegetarianism, total abstinence, and other recent austerities, though advocated on other grounds, recommend themselves to the feelings of many from their falling in with this deep-seated propensity to A., which seems a perverted development from the great truth that *subjection* to the flesh degrades man's spirit.

Even in the Roman Church, ascetic practices have been modified in recent times; fastings are less rigorous, and the self-sacrifice of conventual life is more directed to beneficial ends. Mohammedanism has undergone the same change. In the Greek Church, monasticism had always a milder form.

ASCHAFFENBURG, *â-shâf'fėn-bôrg':* chief t. on the right bank of the Maine, in the Bavarian district of Unterfranken; lat. 50° 1′ n., long. 9° 7′ e. It is built upon an eminence, and has both a healthful and attractive situation; but the streets are narrow, irregular, and slope steeply towards the river. The castle of Johannisberg, built 1605–14, by Johann Schweikhardt, elector of Mentz, and the favorite hunting residence of many of his successors, forms a quadrangle, with towers at each corner, and overlooks the whole town. Besides the collegiate church, the military barracks, and the town hospital, A. possesses a Roman villa, built by King Louis I., 1849, in imitation of the Castor and Pollux edifice discovered at Pompeii. A. is celebrated for its manufacture of colored papers; it has considerable trade in wood, building-stone, tobacco, wine, etc. A. existed as early as the invasion of Germany by the Romans, who built a castle here. In 974, Otto I., Duke of Swabia and Bavaria, founded the collegiate church, which greatly increased the prosperity of the place. After Otto's death the town came into the possession of the abps. of Mentz, and remained with them until the dissolution of the Germanic empire. In 1814, with the principality of which it is the capital, it was ceded to Bavaria. Pop. 18,091.

ASCHAM, *ăs'kăm,* Roger: 1515—68; b. Kirby Wiske,

Yorkshire: distinguished English writer and classical scholar. He received his early education in the family of Sir Anthony Wingfield, and in 1530 entered St. John's College, Cambridge, where he took his degree of B.A., 1534. The study of the classics, especially Greek, had recently been revived at Cambridge, and the natural bent of A. impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils; and in lack of a Greek chair at that time, he was appointed by the univ. to read lectures in the public schools. He at first opposed the then new method of pronunciation, still used in England; but afterwards adopted and defended it. His leisure hours were given to music, penmanship, and archery. In defense of the latter art, he wrote, in 1544, a treatise entitled *Toxophilus*, the pure English style of which, independently of its other merits, ranks it with classical English literature. For this treatise, dedicated to Henry VIII., he was rewarded with an annual pension of £10, equivalent to about £100 of the present money. About the same time, he was appointed university orator. In 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the Lady Elizabeth. In this office he gave the highest satisfaction; but at the end of two years abruptly resigned it, on account of some offense he had taken at some persons in the princess's household. That he did not lose favor at court, however, is manifest, from his having soon been appointed secretary to Sir Richard Morysin, ambassador to the court of Charles V. He spent three years in Germany, and published an account of his observations in that country. He also made a short tour in Italy. During his absence he had been appointed Latin secretary to Edward VI. On his return, after the death of the king, the interest of Gardiner, Bp. of Winchester, secured his appointment to the same office under Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Elizabeth retained him at court in the double capacity of secretary and tutor, which he discharged till his death. His principal work, *The Schoolmaster*, a treatise on classical education, was pub., 1571, by his widow. His Latin letters and poems have been frequently reprinted. The best edition of the former is that of Elstob (Oxford, 1703). To an edition of his English works, by the Rev. J. Bennet (1767), is prefixed a life by Dr. Johnson.

Ascham, a case for the reception of the bow, arrows, strings, and other accoutrements of the archer, derives its name from the author of the *Toxophilus*.

ASCHERSLEBEN, *âsh-ĕrs-lā'bĕn:* t. in the dist. of Magdeburg, prov. of Prussian Saxony; lat. 51° 46′ n., long. 11° 27′ e.; on the river Eine; 32 m. distant from Magdeburg. The inhabitants are occupied chiefly in agriculture and gardening; its trade is not very important.

It has, however, considerable manufactures of woolens, linens, earthenware, etc. Pop. 27,245.

ASCIDIA, n. plu. *ăs-sĭd′ĭ-ă*, or *ăs-kĭd′ĭ-ă*, or ASCID′IANS, n. plu. *-ĭ-ănz* [Gr. *askidĭon*, a little bag]: small marine organisms, belonging (with the Salpidæ) to the *Tunicata*. The classification of the *Tunicata* has been much debated. They were once regarded as mollusks, and afterwards as worms, but when their embryology and early stages were studied and it was found that they passed through a tadpole-like stage, in which the tail is supported by a notochord, and that in other respects they approached the vertebrates they were placed with the vertebrates in the group Chordata. The ascidians, with the other *Tunicata*, are acephalous, or destitute of a head, and are enclosed, not in a shell, but in an elastic tunic with two orifices, composed of a substance apparently identical with the *cellulose* of plants, consisting only of carbon and hydrogen. Within the external tunic is a muscular membrane, regarded as corresponding to the *mantle* of mollusca, and the openings of which agree with those of the tunic. The greater part of the cavity of the mantle forms a branchial sac, the lining of which, folded in various ways, constitutes the gills (*branchiæ*); and into it, by the respiratory movements, currents of sea-water are continually brought, passing out through the vent or anal orifice. Multitudinous *cilia* in the mouth and branchial sac cause by their action this continual flow of water. The motion of the cilia is apparently quite involuntary. By this flow of water, the particles of food requisite for the animal are brought in, so that the aeration of the blood and the supply of the stomach are carried on together and by the same means. The esophagus or gullet opens from the branchial sac, which is indeed regarded as probably an expansion of the upper part of it—a dilated pharynx. Under the branchial sac is the stomach; and the alimentary canal, which is more or less tortuous, finally returns upon itself, so that the two orifices are not far separate. The liver consists of follicles produced into tubes, and communicating with the stomach by a single opening. There is a heart and a circulation of blood, with the remarkable peculiarity of alternations in its course, the circulation every now and then pausing and being reversed. The transparency of many of the ascidians permits these and other internal movements to be easily observed. The nervous system is very simple, consisting of a single ganglion, situated between the mouth and the anal orifice, sending out filaments to both of them, and other branches over the surface of the mantle. The mantle is capable of contracting suddenly to eject a jet of water, and with it any body the presence of which is disagreeable. The mantle contracts and ejects water, also when the animal is touched, and this appears to be the only means of defense. There is no trace of eyes or other organs of special sense.

The ascidians are found in all seas, and often constitute

an important part of the food of fishes. Some of them are occasionally used as human food, as *Cynthia microcosmus* on the shores of the Mediterranean. Many of them are very small, but some attain a size of five or six inches in diameter, and when touched eject water to a considerable height, the largest of them to about three feet. Most ascidians are fixed by the base, in their mature state, to some solid substance, as a rock or seaweed; sometimes by the intervention of a stalk or peduncle. Some pelagic forms, however, are free-swimming. In some kinds (*Social Ascidians*), the peduncles of a number of individuals are connected by a tubular stem, and to some extent they have a common circulation of blood, although each has its own heart, respiratory apparatus, and digestive system; and if a ligature is drawn around the peduncle of one so as to cut it off from the common circulation, circulation takes place in it as in a solitary ascidian. In other kinds (more strictly called *Compound Ascidians*—which designation, however, is by some authors applied to those just described, while these are called *Aggregate Ascidians*), the tunics of many are united into a mass, and they form systems like zoophytes. The compound system sometimes bears a general resemblance to an actinia. Very frequently it forms a slimy crust upon algæ, shells, etc., or projects in globular or conical masses. The individuals are sometimes connected by a gelatinous flesh, which consists of cellulose, and there is sometimes a calcareous deposition in this connecting substance as in the compound polyps. The individuals in these systems have always sprung by gemmation from one, and both the solitary and compound ascidians propagate by eggs. The young have the power of active locomotion, resemble tadpoles in form, and swim by means of a vibratile tail, which disappears when they settle, being usually detached by contraction at the base. The sexes are supposed to be distinct in only some of the ascidians. The ovaries are usually large, and the ova are carried away by the stream which passes through the animal. It is in the solitary ascidians that the highest organization is to be observed, and in which a distinction of sexes appears. In them, a muscular ring surrounds the mouth, and can be closed to exclude what is unfit to enter. Within this aperture there is also a fringe of tentacula, short and simple, or longer and minutely divided. In the compound ascidians, gemmation does not begin till the single animal has been fully developed; thereafter, bud after bud is produced, according to the plan upon which the compound system is constructed, and the procreative force of the germ-mass finally exhausts itself in the formation of male and female organs, in which that force is again mysteriously renewed under its two forms of the spermatozoon and the germinal vesicle, by the combination of which the reproductive cycle again begins its course.

ASCIDIOIDA, n. plu. *ăs-kĭd′ĭ-oy′dă* [Gr. *askidĭon*, a little bag; *eidos*, resemblance]: a class of molluscous animals

which have often the shape of a two-necked bottle; same sense af *ascidia;* synonym of 'Tunicata.'

ASCIDIUM, n. *ăs-kĭd'ĭ-ŭm,* Ascid'ia, n. plu.: in *bot.,* a form of leaf in which the stalk is hollowed out and closed by the blade as by a lid; a pitcher-leaf.

ASCII, n. plu. *ăs'ĭ-ī,* or *ăsk'ĭ-ī,* Ascians, n. plu. *ăs'ĭ-ănz,* or *ăsk'ĭ-ănz* [L. *ascĭus,* shadowless—from Gr. *askĭŏs,* shadowless, dark—from Gr. *a,* without; *skĭă,* a shadow]: applied to the inhabitants of the torrid zone, who are shadowless at noon. They are also called Amphis'cii, because when not shadowless their shadows will at noon fall northwards one part of the year and southwards at another. The inhabitants of the n. temperate zone, at noon have their shadows always falling northwards, and those of the s. temperate zone always south, and are called Antis'cii, *-sĭ-ī.* In the frigid zones, when the sun is above the horizon, the shadows of the inhabitants are directed to every point of the compass in succession, and they are called Peris'cii, *-sĭ-ī.*

ASCITÆ, *ăs-sī'tē,* or Ascitans, *ăs-sī'tănz* [Gr. *askos,* a leathern bottle]: a sect of Montanists who arose in the 2d c. Their name was designed to express the fact that some Bacchanals of their party believed the passage in Matt. ix. 17, which speaks of pouring new wine into new bottles, required them to blow up a skin or bag, and dance around it when inflated, which accordingly they did with suitable vigor, as an act of solemn worship.

ASCITES, n. plu. *ăs-sī'tēz* [Gr. *askos,* a cavity or bladder]: dropsy of the abdomen; a morbid accumulation of serous fluid in the cavity of the peritoneum. Ascitic, a. *ăs-sĭt'ĭk,* or Ascit'ical, a. *-ĭ-kăl,* dropsical. Ascit'ically, ad. *-lĭ.* See Dropsy: Liver, Diseases of the.

ASCITITIOUS, a. *ăs'sĭ-tĭsh'ŭs* [L. *ascis'co,* I receive, I adopt]: additional; supplemental.

ASCLEPIAD, n. *ăs-klē'pĭ-ăd:* a choriambic verse first used by Asclepias, consisting of four feet—viz., a spondee, two choriambi, and an iambus. Asclepiadean, a. *ăs-klē-pĭ-ăd'ē-ăn,* or Asclepiad'ic, a. *-ĭk,* pertaining or relating to.

ASCLEPIADACEÆ, *ăs-klē'pĭ-ă-dā'sē-ē,* or Asclepia'deæ: nat. ord. of dicotyledonous or exogenous plants, mostly shrubs, often with twining stems, almost always with milky juice. The leaves are entire, and have cilia between their stalks in place of stipules. The flowers are peculiar in their structure, though symmetrical and regular. The calyx is divided into five segments, the corolla into five lobes; there are five stamens, and the stigma has five angles. The filaments are usually united to form a tube, generally furnished with a coronet of peculiar hood-shaped appendages; the anthers are two-celled, the pollen grains cohering in wax-like masses, which fall out of the anther cells, and become attached to glands at the angles of the stigma; there are two ovaries and two styles very close

together, and often very short, with one dilated stigma common in both. The fruit consists of two follicles, or, by abortion, of one only, having numerous imbricated seeds with thin albumen, the ends of the seeds terminating in long down. There are about one thousand known species, natives chiefly of warm climates. Some of them are cultivated in gardens and hot-houses, upon account of their curious or beautiful flowers, among the most familiar of which are some of the species of *Asclepias* (q.v.) or Swallow-wort; perhaps none of them is more highly esteemed than *Stephanotis floribunda*, the fragrance of which equals its beauty; it is sought for bridal garlands. No hot-house climber is better known than *Hoya carnosa*, at each flower of which a drop of honey hangs. A number of species are medicinal, as Indian Sarsaparilla (q.v.), (*Hœmidesmus Indicus*); Mudar (q.v.), (*Calotropis gigantea*), highly prized in the East Indies; *Sarcostemma glaucum*, the Ipecacuanha of Venezuela; *Tylophora asthmatica* and *Secamone emetica*, the roots of which are used as emetics, and in smaller doses as cathartics, and the former of which is reckoned among the most valuable medicinal plants of India; *Cynanchum acutum*, which yields a purgative called Montpelier Scammony, and *Vincetoxicum officinale*, which possesses similar properties. Argel (q.v.), much used for adulterating senna, belongs to this order.—The down of the seeds is used sometimes as a substitute for silk or cotton (see Asclepias); and the stems of not a few species afford useful fibres, as those of the *Asclepias Syriaca* (see Asclepias), the Mudar (q.v.), and other species of *Calotropis*, natives of India and Persia, *Hoya viridiflora*, *Holostemma Rheedianum*, etc. The Mudar or Yercum fibre is very highly extolled by Dr. Royle (*Fibrous Plants of India*). The bark of *Marsdenia tenacissima*, a small climbing-plant, yields a fibre called *Jetee*, of which the Rajmahal mountaineers make bowstrings, remarkable for their great elasticity, which they are supposed to owe in some measure to the presence of caoutchouc. The fibre of *M. Roylei* is used in Nepal. *Orthanthera viminea*, which grows at the base of the Himalayas, and has long leafless wandlike stems of ten ft. in height, yields a fibre of remarkable length and tenacity, supposed to be peculiarly suited for rope-making. The fibres of *Leptadenia Jaquemontiana* and *Periploca aphyllum* are used in Sinde for making the ropes and bands used in wells, as water does not rot them.—The milky juice of most species of A. is acrid, but in some it is bland, and they are used for food, as is the milk itself of the Kiriaghuna or Cow-plant of Ceylon (*Gymnema lactiferum*). A few species, as *Marsdenia tinctoria*, a native of Silhet, yield indigo of excellent quality. The flowers of the genus *Stapelia* have a strong smell of carrion, and flies sometimes lay their eggs upon them, as it were, by mistake. There are about 20 species in e. and central United States, of which the Butterfly Weed (*A. tuberosa*) is the most brilliant.

ASCLEPI'ADÆ, or Asclepiades: see Æsculapius.

ASCLEPIADES, *ăs'kle-pī'ă-dēz:* a Greek physician, b. at Prusa, in Bithynia; lived during the early part of Cicero's life. He has been confounded with several other persons of the same name. He seems to have wandered about considerably before he finally settled at Rome; as we read of his being at Alexandria, Parium on the Propontis, and Athens. It is not known either when he was born or when he died. A. was opposed to the principles of Hippocrates in medicine. Pliny, who professes very little respect for him, reduces his medicinal remedies to five: abstinence from flesh, abstinence from wine under certain circumstances, friction, walking, and 'gestation' or exercise in carrying, by which he proposed to open the pores, and let the corpuscles which caused disease escape in perspiration; for his leading doctrine was, that all disease rose from an inharmonious distribution of the small, formless corpuscles of which the body was composed. He is said to have been very popular with the Romans on account of his pleasant and simple cures. His maxim was, that a physician ought to cure surely, swiftly, and agreeably. A. is also alleged to have been the first who distinguished between acute and chronic diseases, but his knowledge of anatomy was apparently slight. The fragments of his writings which remain have been gathered together, corrected, and published by Gumpert, under the title, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798).

ASCLEPIAS, *ăs-klē'pĭ-ăs,* or SWALLOW-WORT: genus of plants, type of the nat. ord. *Asclepiadaceæ.* The corolla is wheel-shaped and reflexed; the coronet fleshy, and each of its hooded tips has a horn. The species are generally upright—seldom climbing and twining—herbaceous plants with opposite, whorled, or alternate leaves. They are mostly American. The flowers are disposed in simple umbels between the leaf-stalks.—*A. Syriaca,* Syrian or Virginian Swallow-wort, sometimes called Virginian Silk, appears to be a native of N. Amer., and not of Syria as was supposed. It is frequently cultivated in flower-gardens. It has an unbranched stem 4–7 ft. high; thick, ovate leaves, covered with a grayish down on the under side, and large, stalked, nodding umbels of many dull red flowers, which diffuse a strong and sweetish odor. The whole plant is full of an acrid white milk, which contains caoutchouc. The young shoots are eaten in N. Amer. like asparagus, as those of *A. stipitacea* are in Arabia. A brown well-tasted sugar is prepared in Canada from the flowers; and the silk-like down of the seeds has been used for the manufacture of textile fabrics, either alone, or with wool or silk, but is more frequently employed for the preparation of wadding, and for stuffing mattresses and pillows. The plant is valuable chiefly for the fibre of its stalks, which is used for the manufacture of thread, cloth, ropes, nets, etc., in many parts of N. Amer., and on account of which it has been recommended for general cultivation in Europe. The fibre is said to be of superior quality. The plant rapidly extends by its creeping roots, and readily

becomes a weed, where it has been introduced.—The roots of several other N. Amer. species are used as diaphoretics and expectorants, as *A. incarnata*, *A. tuberosa*, etc. The latter is a very ornamental garden-flower, and is called Butterfly Weed and Pleurisy Root in the United States, where it is frequent on stony and sandy grounds. *A. Curassavica* is called Wild Ipecacuanha in the West Indies, and a decoction of it is used by the negroes as an emetic and purgative.

ASCOLI, *âs'kō-lē* (anciently, *Asculum Picenum*): old city of Italy, cap. of the province Ascoli-Piceno; seat of a bishop; lat. 42° 50′ n., long. 13° 37′ e. It is built on a hill, on the right bank of the Tronto, which formed the boundary between the late Roman and Neapolitan territories. From the Adriatic, it is 16 m. w.; from Ancona, 53 s. Its harbor (Porto d'Ascoli) has some coasting-trade, and is defended by two forts. The town is beautifully situated, commanding a fine view of the fertile valley through which the river flows, and of the rugged Apennines, which here rise 7,212 ft.

In ancient times, it was inhabited by the Piceni, the descendants of a colony of Sabines, who maintained their independence against the Romans until B.C. 268. Nearly two centuries later, they were prominent in the Social War; and on the taking of their town by Pompeius Strabo, were subjected to the severest punishments. The town was annexed to the papal states by Pope Clement V. 1426; and with them passed to the kingdom of Italy. Pop. (1901) 28,882.

ASCOMYCETES, n. *ăs'kŏm-ĭ-sē'tēz* [Gr. *askos*, a bladder; *mŭkēs*, a mushroom]: in *bot.*, the group of Fungi that reproduce by asci. See ASCUS.

ASCOSPORES, n. plu. *ăs'kŏ-spōrz* [Gr. *askos*, a bladder, and *spores*]: in *bot.*, the spores or reproductive cells developed in asci.

ASCRIBE, v. *ăs-krīb'* [L. *ascrībĕrĕ*, to add to a writing —from *ad*, to; I write—*lit.*, to add to a writing]: to impute to; to assign to as a cause; to attribute. ASCRI'BABLE, a. *-bă-bl*, that may be attributed to. ASCRI'BING, imp. ASCRIBED, pp. *ăs-krībd'*. ASCRIPTION, n. *ăs-krĭp'shŭn*, the act of attributing to. ASCRIPTI'TIOUS, a. *-tĭ'shŭs*, ascribed; imputed; assigned.

ASCUS, n. *ăs'kŭs*, ASCI, plu. *ăs'kī* [Gr. *askos:* L. *ascus*, a bladder]: in *bot.*, large cells, in which new cells or spores, usually eight, are developed—a common mode of reproduction in certain cryptograms; called also ASCELLI. ASCIGEROUS, a. *ăs-sĭj'ĕr-ŭs* [L. *gero*, to wear, to carry about]: having asci.

ASELLI, *â-zel'ē*, ASEL'LIO, or ASEL'LIUS, CASPAR: abt. 1581—abt. 1626; b. Cremona: celebrated Italian physician. He served at first as a military surgeon, afterwards became prof. of anatomy and surgery at Padua. In 1622, while at Milan, he discovered the lacteal vessels. Before A.'s time, anatomists had supposed that the

chyle was carried from the intestines into the liver by the mesenteric veins. One day, dissecting a living dog, he noticed for the first time the multitude of little vessels, which suck up the nutritive portion of the food. At first, he took them for nerves; but on pricking one with the point of his scalpel, a white liquid spurted out, and the discovery flashed on him in a moment. He seems, however, never to have understood or described them with complete accuracy. His treatise on his discovery was pub. a year after his death. It is entitled *De Lactibus, sive Lacteis Venis, Quarto Vasorum Mesaraicorum Genere, Novo Invento, Dissertatio,* and has several times been reprinted.

ASEL′ in Ichthyology: generic name now disused, but by which the cod and other *Gadidæ* were formerly sometimes designated. It is retained in the pharmacopœias, in the name of Cod-liver Oil, *Oleum jecoris aselli.*—The same generic name is now employed, in a different department of natural history, to denote a genus of small Isopod Crustaceans, one of which, *A. aquaticus,* is sometimes called the Water-Hog-louse. This genus is the type of a family, *Asellidæ.*

ASEPSIS, see ANTISEPTIC: ANTISEPTIC SURGERY.

ASEPTA, n. *ă-sĕp′tă* [Gr. *aseptos,* not liable to putrefy]: substances not liable to putrefaction. ASEPTIC, a. not liable to putrefy.

A′SES [singular in Old Norse *As,* pl. *Aesir;* in Gothic, *Ans;* in Saxon. *Os* (*Es*)]: a race of gods in Northern or Scandinavian Mythology (q.v.), though not the oldest, yet the most powerful, like the Jupiter dynasty among the Greeks. They are usually considered as numbering twelve gods, and as many goddesses. The gods are—Odin, Thor, Baldur, Niord, Freyr, Tyr, Bragi, Heimdal, Widar, Wali, Uller, and Forseti; the best known of the goddesses—Frigga, Freyja, Idunna, Eira, and Saga. The worship of the A., or the Odin religion, at least in its outlines, was rooted not only among the nations of Scandinavia, but among the Germanic races generally. Besides other traces, proofs of its prevalence are found in a multitude of Gothic, Saxon, and Old High German proper names; many of which continue in use, though their connection with German paganism passes unperceived: Oswald, Esmond, Oswin, Anselm, Ansgar, etc.

ASEXUAL, a. *ă-sĕks′ū-ăl* [Gr. *a,* without, and *sexual*]: having no distinct sex; applied to modes of reproduction of living creatures, in which the sexes are not concerned.

ASGARD, *ăs′gârd:* in Scandinavian Mythology (q.v.), the home of the gods. Odin and the other gods dwelt in the mansion Gladsheim, the goddesses in Vingulf. Warriors slain in battle lived here in Walhalla. Every day the gods assembled in council beneath the ash-tree Yggdrasil.

ASGILL, *ăs′gĭl,* JOHN: an eccentric English *littérateur;* b. about the middle of the 17th c., d. 1738, Nov. He

studied for the bar; but being addicted to writing political pamphlets, he soon became involved in pecuniary difficulties. Upon the passing of the act for the resumption of forfeited estates in Ireland, 1699, he went thither, found the whole country wrangling in lawsuits, secured a lucrative practice, and obtained a seat in the Irish parliament. But he had recently published an extraordinary pamphlet, entitled, *An Argument proving that, according to the Covenant of Eternal Life revealed in the Scriptures, Man may be translated hence into that Eternal Life without passing through Death, although the Human Nature of Christ himself could not thus be translated till he had passed through Death* (1700). The public flew into a rage against this absurd production; the Irish parliament voted it a blasphemous libel, and the astonished author was expelled from the house after four days. In 1705, A. returned to England, and entered the English parliament as member for Bramber, in Sussex. But the fame of his unlucky pamphlet haunted him perpetually: the English house, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burnt by the common hangman, as profane and blasphemous, and expelled A., 1707, Dec. 18. After this, he betook himself for a living to professional practice of a humble grade—still inditing pamphlets.

ASH, n. *ăsh* [AS. *æsc:* Icel. *askr*]: a well-known tree. Adj. made of or pertaining to the ash; the *Fraxĭnus excelsior*, or common ash, ord. *Olĕācĕæ*. Ashen, a. *ăsh′ĕn*, made of ash; having the color of ashes. Ash-keys, or Ashen-keys, seed vessels of the ash-tree, called by botanists *samaras*, i.e., dry, indehiscent, winged, two-celled, two-seeded capsules. Their length and lateral compression make the resemblance to keys. The term is used in heraldry, the seed-vessels being occasionally represented on an escutcheon.

ASH (*Fraxinus*): genus of trees belonging to the nat. ord. *Oleaceæ*, and distinguished by very imperfect flowers, in which the calyx is obsolete, and the corolla either wanting or 3–4 partite; the fruit is a *samara*, a seed-vessel foliaceous at the extremity. The leaves are deciduous, and are pinnate with a terminal leaflet. There are about fifty species, natives mostly of Europe and North America. —The Common Ash (*F. excelsior*) grows wild in the middle and s. of Europe and n. of Asia. It is an undoubted native of Britain. The flowers are quite naked; the leaves have five or six pairs of leaflets. The flowers appear before the leaves in spring, and the tree is not covered with leaves until the season is far advanced, losing them again early in autumn. It is, however, a most beautiful umbrageous tree, highly ornamental in parks; though extremely injurious to the grass or crops immediately around it. It rises to the height of 100–150 ft., generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coach-makers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the dispo-

sition of its fibres, and finely veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The A. prefers a loamy soil, but grows in almost any, and succeeds in situations too elevated or too exposed for most other trees. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the *Weeping A.*, with boughs bent almost straight down to the ground; the *Curled-leaved A.*, with dark-green wrinkled or curled leaves; and the *Entire-leaved A.*, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *F. simplicifolia, F. heterophylla,* etc.—The Small-leaved A. (*F. parvifolia*) and the Lentisk A. (*F. lentiscifolia*) are both natives of the shores of the Mediterranean, and are very graceful and ornamental trees.—The American A., or White A. (*F. Americana*), is readily distinguished from the Common A. by its lighter bark and paler green leaves. The flowers have a calyx, and the leaflets are shortly stalked and entire (those of the Common A. being sessile and serrated). It is abundant in New Brunswick and Canada, but becomes rare to the s. of New Jersey. The trunk often rises more than 40 ft. undivided. The wood is used for the same purposes as that of the Common A.—The Red A., or Black A. (*F. pubecens*), is very similar, but of smaller size, and has a deep brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground.—The Black A. or Water A. of the New England States, New Brunswick, etc. (*F sambucifolia*), is a large tree with buds of a deep blue color.—The Blue A. of Ohio, Kentucky, Tennessee, etc. (*F. quadrangulata*), is also a large tree. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length.—The Green A. (*F. juglandifolia=viridis*), recognized by the brilliant green of its young shoots, is found chiefly in the middle states; and the Carolina A. (*F. Caroliniana*), remarkable for the great size of its leaflets, chiefly in the southern states. Besides these, North America produces a number of other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the Common A.—In the s. of Europe grows the Manna A., or Flowering A. (*F. Ornus*, called *Ornus Europæa* by some botanists), whose flowers have a 4-partite calyx, and four small yellowish-white petals. The tree has much resemblance to the Common A. From it the substance called Manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations, it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *F. rotundifolia,* a

native of Greece and the Ionian Islands, yields it also in perhaps equal quantity. The Common A. is said sometimes to produce the same exudation in the same warm climates.

The Mountain A. is the Rowan Tree (q.v.), and belongs to a different nat. ord. Its resemblance to the A. is chiefly in its leaves.

The A. has a peculiar importance in Scandinavian mythology. The first man and woman formed were Ask and Embla (Ash and Elm). The court of the gods is represented in the Edda, as held under an A., called Yggdrasil (q.v.). Connected, perhaps, with these traditions is the superstitious belief in A. twigs as a charm against witchcraft and magic.

ASHAMED, pp. or a. *ă-shāmd'* [AS. *ascamian:* Meso-Goth. *gaskaman*, to be ashamed: AS. *a*, on; and Eng. *shame*]: confused from a sense of guilt or unworthiness; covered with shame. Asham'edly, ad. so as to manifest shame; bashfully.

ASHANTI, or Ashantee, *ă-shân'tē*, a former negro kingdom, now a Brit. protectorate, in w. Africa on the Gold Coast; lat. 5°–9°, long. 0°–4° w.; cap. Kumassi. A large part of the country is in forest; and the open land is very fertile, producing maize, millet, rice, yams, tobacco, sugar, cocoa, gums, dye-woods, and pineapples and other fruit. Drainage and limited communication are by the Volta, Prah, and Assinie rivers. Being shut in from the sea-board and having only a caravan route between Coomassie and Cape Coast Castle, A. has but little commerce, its exports being mainly gold-dust and palm-oil. The natives show skill in manufacture of cotton goods, earthenware, and sword-blades, but are still quite savage. It is believed that the establishment of the A. kingdom was made several centuries ago by an emigration from n. of the Kong Mountains. In 1700 Osai Tutu I. conquered Akim, Assin, Gaman, Denkira, and neighboring states, and made Kumassi his capital. During 1807–26 the people were involved in war with Great Britain and were driven from the sea-coast and the territory now forming a part of the Gold Coast Colony. In 1873–4 they were again at war with the English, concerning cession of the Dutch forts to Great Britain; and their capital was burned by Sir Garnet Wolseley 1874; Feb. 6. The king then renounced all claims on the protectorate of the Gold Coast Colony, promised to protect traders, and paid an indemnity to the Brit. govt. In 1876 the Ashantis defeated the Juabins, and the latter took refuge within the Brit. protectorate. After the burning of Kumassi the Brit. govt. did not attempt to assert territorial rights there till 1895–6, when another expedition took possession of Kumassi, forced the submission of the king, who with his chiefs was sent to Sierra Leone, and established a protectorate over the country. Pop. est., 1,000,000—3,000,000.

ASHBOURNE, or Ashborne, or Ashburn, *ăsh'bŭrn:*

market-town in a rich district near the left bank of the river Dove, in the w. of Derbyshire, 13 m. n.w. from Derby. It lies in a fertile valley, amid beautiful scenery. The parish church is cruciform, dating from the 13th c., restored 1845. There are manufactures of cotton, lace, and iron. At A., 1644, the parliamentary troops defeated those of Charles I. Pop. abt. 4,000.

ASHBURNER, Charles Albert: an American geologist; b. Philadelphia, 1854, Feb. 9; d. Pittsburg, 1889, Dec. 24. He graduated at the head of his class at the University of Pennsylvania, and was appointed assistant State geologist in 1875. He originated a method of surveying and representing the geology of the anthracite coal fields which received the approbation of mining engineers throughout the world. He was also an accepted authority on the natural-gas fields. In 1886 he entered private practice as an expert and became closely associated with the Westinghouse interests. He prepared over 20 of the Pennsylvania State geological survey reports.

ASHBURTON, Lord (Alexander Baring): 1774–1848, May 13: younger son of Sir Francis Baring, Bart. In early life he was for many years commercially engaged in the United States and the Canadas, in the service of the great London mercantile house founded by his father, at whose death, 1810, he became the head of the firm of Baring Brothers & Co. In 1812, he was elected M.P. for Taunton; representing that place, Callington, and Thetford, in the liberal interest, till 1831, and in 1832, was returned for North Essex as a moderate conservative. In the short administration of Sir Robert Peel (1834–35), he was pres. of the board of trade, and master of the mint, and was made Baron A. by patent, 1835, Apr. In 1842, Lord A. was appointed special ambassador to the United States, to settle the n.w. boundary question, and other disputes threatening war; and in Aug. of that year, he concluded the famous treaty of Washington, commonly called the A. treaty, establishing by definite agreement the frontier line between the state of Maine and Canada. By this treaty seven-twelfths of the disputed ground, and the British settlement of Madawaska, were given to the United States; but it secured a better military frontier to England, and included heights commanding the St. Lawrence, which the award of the king of Holland, who had been chosen arbiter, had assigned to the Americans. By the 8th and 9th articles, provisions were made for putting an end to the African slave-trade; and the 10th article provided for the mutual extradition of suspected criminals. Lord A. opposed free-trade; but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. His eldest son, William Bingham Baring, Lord A., 1799–1864, was educated at Oriel College, Oxford, entered parliament, 1836, as member for Taunton; was appointed sec. to the board of control, 1841, Sep.; and became pay-master-gen. of the forces, and treasurer of the navy, 1845, Feb.

ASHBURTON RIVER: a stream in western Australia flowing 400 miles and emptying into the Indian Ocean, lat. 22° s.; long. 115° w.

ASHBURTON TREA'TY: a treaty concluded at Washington in 1842, August, by Alexander Baring, Lord Ashburton, and the President of the United States. It defined the boundaries between the United States and Canada.

ASHBY-STERRY, Joseph: a well known English writer on the staff of the *Daily Graphic*. He is novelist and poet, as well as journalist, and among his published books are: *Nutshell Novels* (1890); *The Lazy Minstrel*, a collection of brilliant verse (1892); *Naughty Girl, a Story of* 1893 (1893); *A Tale of the Thames in Verse* (1896); *The Bystander, or Leaves for the Lazy* (1900).

ASHBY-DE-LA ZOUCHE, *ăsh'bĭ-dĕ-la-zooch':* a market town in Leicestershire, England, on the borders of Derbyshire, 17 miles northwest of Leicester. It has wide, well-paved streets, and its parish church of Saint Helen is a handsome building with stained-glass windows, carvings, and monuments. The Ivanhoe baths attract visitors, the waters being beneficial for some ailments. The ruins of Ashby Castle, well known to readers of *Ivanhoe*, which received Mary Queen of Scots as a prisoner, are still visible. Pop. (1901) 4,700.

ASHERA, n. *ăsh'-ĕr-ă* [Heb.]: the word translated 'grove,' in the Old Test. Scriptures, but it appears to have been only a pole of wood, or a stem of a tree, set upright on a circular altar as an object of worship. See Phallus and Linga.

ASHES, n. plu. *ăsh'ĭz* [AS. *asca,* or *asce:* Icel. *aska:* Goth. *azgo:* Ger. *asche,* dust, refuse]: the dust or matter that remains from a burnt body; the remains of any body reduced to dust. Ash, sing. a variety of ash, as in cinder-ash, or tobacco-ash; often used for *ashes,* as in *potash.* Ashy, and Ashen, a. *ăsh'ĭ,* pale; like ashes, Ashery, n. *ăsh'er-ĭ,* an ash-pit. Ashy-pale, pale as ashes. Ash Wednesday, (q. v.), the first day of Lent. Ash-fire, the subdued or low fire used in chemical furnaces.

ASHES: remains of animal and vegetable bodies after burning. It is not strictly correct to speak of the A. of a mineral. When lead, for instance, is exposed to heat, it turns to dross, which has the appearance of A., but is merely the lead combined with oxygen. In the same way, volcanic A., as they are called, are only a finer kind of pumice-stone, the solidified scum of molten lava. The A. of organic substances destroyed by fire consist of the fixed salts contained in these substances. In land-plants, the most important are salts of potash, with silica and lime; in sea-plants, soda takes the place of potash. By lixiviation of the A., the potash or soda is dissolved and separated from the insoluble mass, and is then purified by crystallization. The A. of sea-plants contain also more or less iodine. Peat and turf A. contain, besides alkalies, more or less clay and sand; the same is true of pitcoal, which sometimes contains iron.

Formerly A. or the inorganic ingredients of plants were considered unessential to their existence, but chemistry has taught that a certain proportion of mineral food is absolutely necessary to their development.

The A. of animals are similar to those of vegetables. Bone A. consist largely of lime and phosphoric acid, and are a valuable fertilizer. In timbered countries wood A. are an article of considerable trade. They are used in various arts, e. g., soap-boiling, bleaching, dyeing, and glass-making; for manufacture of potash, and for promoting growth of plants (see FERTILIZERS), to which they supply potash, carbonate of lime, phosphoric acid, and a little magnesia. They are useful also in making available for plants stores of nitrogen which the soil contains, or which it supplies only in forms not readily assimilated.

The covering of the head with A. has long been a common sign of mourning among eastern nations, indicative of the very deepest distress. Instances of this are mentioned in Scripture. Penitents in the early Christian Church signified their sorrow and humiliation in like manner, by standing at the door of the church in 'sackcloth and ashes.' See ASH-WEDNESDAY.

ASHEVILLE, *ăsh'vĭl:* city and county-seat of Buncombe co., N. C.; on the Southern railroad; at the junction of the Swamanoa and French rivers; 275 m. w. of Raleigh and 262 m. by rail n. e. of Atlanta, Ga. A. is in a valuable timber region, and has become an important tobacco market; has manufactories of cotton goods, shoes, ice, flour, wagons, cars, agricultural implements, tanned leather and tobacco. The city is widely famed as a winter and summer health resort, being finely situated on the w. side of the Blue Ridge, about 2,500 ft. above sea-level. It contains the Asheville College for Young Women, Bingham Military School, Asheville School for Boys, Normal College and Collegiate Institute for Young Women, Home Industrial School for Girls, Asheville Farm School for Boys, Industrial School for Colored Youth, a public library, an auditorium, city hall, court house, numerous hotels, banks, churches, etc. It has gas plants, electric light, modern sewerage, and the water works are owned and operated by the city. In the suburbs are Biltmore, the Vanderbilt estate, Pisgah forest, a hunting preserve of 84,000 acres, Riverside Park, and Mt. Beaumont, 2,800 ft. high. The city is governed by a mayor, elected biennially, a council and other officers nominated by the executive. Pop. (1910) 18,762.

ASHFORD, *ăsh'fŏrd*: town on the w. of the confluence of the two upper branches of the river Stour, near the middle of Kent, England, about 54 m. s. e. of London. There are corn and cattle markets, manufactories of

linen goods and pianos, and the Southeastern railway have a large workshop here. There are technical schools, public baths, parks, a hospital, and excellent water supply. Pop. (1901) 12,808.

ASHLAND, *ăsh'land*: city of Boyd co., Ky.; on the Ohio river; on the Chesapeake and Ohio, the Norfolk and Western and other railroads; 144 m. s. e. of Cincinnati, Ohio. It is a shipping point for iron ore and coal, and its manufactures include leather, furniture, sheet steel, cut and wire rails, steel billets, pig iron, wire rods, fire-brick, etc. A. was settled in 1854 and incorporated in 1870, the government being vested in a mayor, elected for four years, and a city council. Pop. (1910) 8,688.

ASHLAND, town and county-seat of Ashland co., Ohio; on the Erie and other railroads; 65 m. s. w. of Cleveland. It has important manufactures, a large trade in grain, public school library, national bank, newspapers, and is the seat of Ashland University (non-sectarian), founded 1878. Pop. (1910) 6,795.

ASHLAND, city and county-seat of Jackson co., Ore.; on the Southern Pacific railroad; 341 m. s. of Portland and 431 m. n. of San Francisco. There are in the vicinity valuable gold mines, deposits of cinnabar, kaolin, marble, granite, sandstone, etc.; has a considerable fruit-growing interest and the manufactories include box factory, foundry and machine shops, quartz-mill, ice-plant, sash and door factories, flour mills, planing mills, creamery, lumber yards, etc. The mineral springs nearby are developing A. into a health resort. A. is the seat of the Southern Oregon Normal School and the Southern Oregon Chautauqua and has several public school buildings and churches, and 2 banks. There is an extensive electric light and power plant, and the city owns and operates the water works. The city was first settled in 1858, became a borough in 1874 and a city about 1888. The city government consists of a mayor, elected annually and a council of 6 members, 3 of whom are elected each year. Pop. (1910) 5,020.

ASHLAND, borough in Schuylkill co., Penn.; in the valley of the Mahanoy; on the Lehigh Valley and the Philadelphia and Reading railroads; 12 m. n.w. of Pottsville and 119 m. n.w. from Philadelphia. It is in the centre of the anthracite coal fields and also has large machine shops, planing-mills, flour-mills, and foundries and manufactures of various kinds. The town contains the State Miners' Hospital, numerous schools and churches, a public hall, national bank, hotels, a park, daily and weekly newspapers, is lighted by gas and electricity, and the water works are owned and operated by the town. A. was settled in 1850 and

incorporated in 1857, the government being vested in a mayor elected every three years and a council of 15 members. Many of the people are of foreign birth. Pop. (1910) 6,855.

ASHLAND: city and county-seat of Ashland co., Wis.; on Chequamegon Bay, one of the best harbors on Lake Superior; on the Wisconsin Central, the Chicago, St. Paul, Minneapolis and Omaha, the Northern Pacific and the Chicago and Northwestern railroads; 80 m. e. of Duluth and 185 m. n.e. of St. Paul, Minn. It is connected by steamers with all lake ports, and by excursion boats with Washburn and Bayfield. The harbor is sheltered by the Apostle Islands; and besides its general lake traffic is the lake-port for export for all the hematite ore produced in the great Gogebic Iron Range and to accommodate these shipments a number of enormous ore docks have been built. There are also extensive shipments of lumber, brown-stone and manufactured goods. The industries include lumber mills, charcoal blast furnaces for the manufacture of pig-iron, pulp works, foundries and machine shops, brown-stone quarries, smelting works, railroad shops, steel plant, etc. The city contains the North Wisconsin Academy, Sisters' Hospital (R.C.), Rhinehart Hospital, the Vaughn Public Library, opera house, banks, churches, schools, U. S. Gov't building and postoffice, and hotels. A. was settled in 1854, incorporated in 1863, and chartered as a city in 1887, the government, under a charter of 1889, being vested in a mayor elected every two years, a municipal council of 20 members and other officials. Pop. (1910) 11,594.

ASHMEAD-BARTLETT, William Lehman; b. New Brunswick, N. J., 1851; son of an Eng. non-conformist minister. He was educated at Oxford Univ. Through his mother's acquaintance with Baroness Burdett-Coutts (q.v.) he became her protegé, and later her private sec. In 1881, Feb. 12, he married the baroness, 37 years his senior, who, by this marriage, surrendered part of her immense fortune. By royal license he assumed the name Burdett-Coutts. He was special commissioner of the Turkish Compassionate fund in the Russo-Turkish war 1877; was one of the originators of the Fisheries Exhibition; helped organize relief in distressed districts of Ireland 1879-80; trustee of Baltimore Fishery School; Master of the Turners' Company 1888-9 and was one of the founders of the British East African Possessions.

In 1900 he went to South Africa as correspondent for the *Times* to investigate the treatment of the sick and wounded and this led to the appointment of a Royal Commission of Inquiry. Upon the publication of

its report the Government promised a 'drastic reform' in the army (session 1901) which has since been put into operation. Since 1885 he has represented Westminster in Parliament and was instrumental in passing the Hempstead Heath Act (1885), Police Enfranchisement and Metropolitan Management Amendment Acts (1887) and the Advertisement Rating Act (1889). He wrote a volume on the Russo-Turkish War.

ASHTABULA, *ăsh'ta-bū'lá:* city in Ohio, and in county of the same name; on both sides of Ashtabula river, near its mouth; 54 m. from Cleveland, 3 m. from Lake Erie; on the Ashtabula, Youngstown and Pittsburgh, the Lake Shore and Michigan Southern and the New York, Chicago and St. Louis railroads. It is also connected with the surrounding cities and towns by electric railway. The city is the centre of a rich agricultural and dairying region and has large manufactories of woollen goods, farm implements and leather and also machine shops, pail factory, hoop factory, tool factory, pole and shaft factories, etc. There is an extensive railroad and lake commerce and owing to its excellent location on Lake Erie it has become an important transfer shipping point, especially for iron and coal. The city contains a Carnegie public library, city hospital, 3 banks, numerous churches, public grammar and high schools and a business college, and other large buildings. The city was first settled in 1801, was organized as a township 1805 and incorporated as a city 1892. In 1876, Dec. 29, a railway accident occurred here at a high bridge over the river and over 100 lives were lost. The city government is vested in a mayor, board of public service and a city council of 7 members elected every two years. Pop. (1910) 18,266.

ASHTORETH, n. *ăsh'tō-rĕth* [Gr. *astar'tē:* in Phœnician, the wife of Baal]: a goddess of the ancient Sidonians and Philistines, identified with Venus of the Romans; Astarte. ASH'TAROTH is the plu. form of *Ashtoreth.* See ASTARTE.

ASH-WEDNESDAY: first day of Lent (q.v.), so called from the Rom. Cath. ceremony of strewing ashes on the head as a sign of penitence. This custom, introduced probably by Gregory the Great (590-604), was sanctioned by Pope Celestin III., 1191, and afterwards generally prevailed. Before mass, the ashes were consecrated on the altar, sprinkled with holy water, and signed three times with the cross, while the priest recited the words, *Memento quia pulvis es, et in pulverem reverteris!* ('Remember that thou art dust, and must return to dust!') Next, they were strewed on the heads of the officiating priests, the clergy and the assembled people. The ashes were said to be those of the palms consecrated on the preceding Palm Sunday

NORTHERN AND CENTRAL ASIA
SCALE OF MILES
0 100 300 500
Longitude 90 East from 100 Greenwich
EUROPEAN RUSSIA
ASIATIC EMPIRE
NORWAY
SWEDEN
Finland
Gulf of Bothnia
BARENTS SEA
KARA SEA
ARCTIC OCEAN
Spitzbergen
Franz Josef Land
Nova Zembla
Taimyr Peninsula
Yalmal Peninsula
Kola Peninsula
White Sea
Archangel
St. Petersburg
Moscow
R. Volga
R. Kama
R. Ural
R. Ob
R. Yenisei
R. Lena
R. Amur
Ural Mts.
Stockholm
Lake Ladoga
R. Onega
R. Dwina
R. Petchora
R. Oka
Nishni Novgorod
Ekaterinburg
Perm
Kasan
Samara
Saratov
Astrakhan
Tsaritsyn
Uralsk
Orenburg
Ufa
Tobolsk
Tiumen
Omsk
Tomsk
Barnaul
Semipalatinsk
Petropavlovsk
Akmolinsk
Irtish R.
Obdorsk
Turukhansk
Yeniseisk
Krasnoiarsk
Irkutsk
Verkne Udinsk
Nertchinsk
Yakutsk
Verkhoiansk
Ust Kutsk
Kirensk
Olekminsk
Vilui R.
Lena R.
Aldan R.
Okhotsk
Sea of Okhotsk
Kamtchatka
Petropavlovsk
Anadir
Gulf of Anadir
Arctic Circle
Bering Strait
Wrangell I.
Chaun B.
Kolyma R.
Indigirka R.
Yana R.
New Siberia I.
Liakof I.
Taimyr B.
Khatanga B.
Lena Delta
Yana Bay
Kotelnoi I.
Sakhalin I.
Gulf of Tartary
Amur R.
Ussuri R.
Khabarovka
Nikolaievsk
Vladivostok
Port Arthur
Dalny
Korea
Seoul
Fusan
Yokohama
Tokio
Hondo
Yezo
Shikoku
Kiushu
Nagasaki
Kagoshima
Miyazaki
Sea of Japan
Yellow Sea
Gulf of Pechili
Hoang Ho
Peking
Kiakhta
Urga
Kobdo
Uliassutai
Barkul
Hami
Turfan
Aksu
Kashgar
Yarkand
Khotan
Chinese Turkestan
Tsungaria
Gobi Desert
Altai Mts.
Tian Shan Mts.
Kuen Lun Mts.
Thian Shan Mts.
Caspian Sea
Aral Sea
Lake Baikal
Lake Balkash
Lake Issikul
Lake Tengri
Persia
Afghanistan
Kabul
Herat
Merv
Askabad
Bokhara
Samarkand
Tashkend
Khokand
Fergana
Kuldja
Ili R.
Syr-Darya R.
Chu R.
Transcaspian Territory
Gen. Govt. of Turkestan
Gen. Govt. of the Steppes
Gen. Govt. of Amur Province
Akmolinsk
Semipalatinsk
Turgai
Uralsk
Ust Urt
Kara Bogaz Gol
Krasnovodsk
Baku
Kizil Arvat
Geok Tepe
Tchimbai
Lepzinsk
Kopal
Vernoye
Aulieata
Tokmak
Petrovsk
Kanitshai
Zaisansk
Ayaguz
Semipalatinsk
Ust Kamenogorsk
Barnaul
Biisk
Tashtybsk
Minusinsk
Abakansk
Achinsk
Kansk
Kainsk
Tara
Tiumen
Ishim
Kurgan
Chelyabinsk
Troitsk
Miass
Zlatoust
Ufa
Orsk
Aktiubinsk
Karabutak
Irgiz
Turgai
Atbasar
Akmolinsk
Petropavlovsk
Ishim
Omsk
Petropavlovsk
Kainsk
Kolyvan
Tomsk
Mariinsk
Achinsk
Krasnoiarsk
Kansk
Nizhni Udinsk
Verkne Udinsk
Selenga R.
Lake Baikal
Irkutsk
Kirensk
Vitim R.
Olekminsk
Aldan R.
Yakutsk
Verkhoiansk
Ust Maisk
Tchabdinsk
Aldansk
Nelkan
Ayan
Okhotsk
Gizhiga
Anadir
Gulf of Anadir
Kresty
Olbut
Drankina
Srednei Kolymsk
Verkne Kolymsk
Nishni Kolymsk
Ostrovnoi
Plotbischtshe
Omskonskie
Stanovoi Mts.
Yablonoi Mts.
Khingan Mts.
Great Khingan
Little Khingan
Manchuria
Mukden
Kirin
Changchun
Liaotung Peninsula
Talienwan
Port Arthur
Dalny
Wei-hai-wei
Chefoo
Newchwang
Chang-te
Niuchwang
Dolon-nor
Kalgan
Paotow
Ning-hia
Lanchow
Hoang Ho
Yellow Sea
Gulf of Pechili
Korea B.
Korea Str.
Tsushima I.
Hamada
Tsuruga
Kobe
Osaka
Nagasaki
Kagoshima
Miyazaki
Kiushu
Shikoku
Hondo
Yezo
Hakodate
Sendai
Nugata
Yokohama
Tokio
Sea of Japan
Kuril Is.
Sakhalin I.
Gulf of Tartary
Amur R.
Ussuri R.
Khabarovka
Nikolaievsk
Vladivostok
Port Arthur
Dalny
Korea
Seoul
Fusan
Yokohama
Tokio
Hondo
Yezo
Shikoku
Kiushu
Nagasaki
Kagoshima
Miyazaki
Sea of Japan
Yellow Sea
Gulf of Pechili
Hoang Ho
Peking
Kiakhta
Urga
Kobdo
Uliassutai
Barkul
Hami
Turfan
Aksu
Kashgar
Yarkand
Khotan
Chinese Turkestan
Tsungaria
Gobi Desert
Altai Mts.
Tian Shan Mts.
Kuen Lun Mts.
Thian Shan Mts.
Caspian Sea
Aral Sea
Lake Baikal
Lake Balkash
Lake Issikul
Lake Tengri
Persia
Afghanistan
Kabul
Herat
Merv
Askabad
Bokhara
Samarkand
Tashkend
Khokand
Fergana
Kuldja
Ili R.
Syr-Darya R.
Chu R.
Transcaspian Territory
Gen. Govt. of Turkestan
Gen. Govt. of the Steppes
Gen. Govt. of Amur Province
Akmolinsk
Semipalatinsk
Turgai
Uralsk
Ust Urt
Kara Bogaz Gol
Krasnovodsk
Baku
Kizil Arvat
Geok Tepe
Tchimbai
Lepzinsk
Kopal
Vernoye
Aulieata
Tokmak
Petrovsk
Kanitshai
Zaisansk
Ayaguz
Semipalatinsk
Ust Kamenogorsk
Barnaul
Biisk
Tashtybsk
Minusinsk
Abakansk
Achinsk
Kansk
Kainsk
Tara
Tiumen
Ishim
Kurgan
Chelyabinsk
Troitsk
Miass
Zlatoust
Ufa
Orsk
Aktiubinsk
Karabutak
Irgiz
Turgai
Atbasar
Akmolinsk
Petropavlovsk
Ishim
Omsk
Petropavlovsk
Kainsk
Kolyvan
Tomsk
Mariinsk
Achinsk
Krasnoiarsk
Kansk
Nizhni Udinsk
Verkne Udinsk
Selenga R.
Lake Baikal
Irkutsk
Kirensk
Vitim R.
Olekminsk
Aldan R.
Yakutsk
Verkhoiansk
Ust Maisk
Tchabdinsk
Aldansk
Nelkan
Ayan
Okhotsk
Gizhiga
Anadir
Gulf of Anadir
Kresty
Olbut
Drankina
Srednei Kolymsk
Verkne Kolymsk
Nishni Kolymsk
Ostrovnoi
Plotbischtshe
Omskonskie
Stanovoi Mts.
Yablonoi Mts.
Khingan Mts.
Great Khingan
Little Khingan
Manchuria
Mukden
Kirin
Changchun
Liaotung Peninsula
Talienwan
Port Arthur
Dalny
Wei-hai-wei
Chefoo
Newchwang
Chang-te
Niuchwang
Dolon-nor
Kalgan
Paotow
Ning-hia
Lanchow
Hoang Ho
Yellow Sea
Gulf of Pechili
Korea B.
Korea Str.
Tsushima I.
Hamada
Tsuruga
Kobe
Osaka

ASIA.

ASIA, *ā'shĭ-a:* largest division of land on the globe, generally regarded as the birthplace of the human race, and the most ancient seat of civilization. Its superficial area, including islands, is estimated at 17,296,000 sq. m., and its population at 840,000,000. This enormous continental mass lies almost entirely in the n. division of the e. hemisphere, while its world of islands extends across the equator on the s.e. On three sides, it is surrounded by the ocean; but on the w., is partially connected with Africa and Europe. The continent is more than four times as large as Europe. Some idea may be formed of its vast extent by the calculations that, though it contains more than half of the whole population of the globe, the number of its inhabitants is so small compared with its area, that Europe may be said to be three times more densely populated. The coast-line is about 33,000 m. in length, and on the s. and e., is diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa, but inferior to those possessed by Europe and America. On the w. side, the Dardanelles and the Sea of Marmora may be regarded as but a slight interruption of the great table-lands of Europe and A. which form the continent of the old world.

Horizontal Configuration.—A. is bounded n., by the Arctic Ocean; e., by the Pacific Ocean; s., by the Indian Ocean; and w., by Europe, the Black Sea, Archipelago, Mediterranean, and the Red Sea. On the extreme n.e., the peninsular land of Kamtchatka is separated from North America only by the narrow Behring's Strait.—On the s.e., a bridge of numerous islands—Sumatra, Java, Borneo, Papua, etc.—extends towards Australia. The body of the continent may be regarded as a trapezium, of which the offsets, consisting of several large peninsulas, bear some resemblance to those of Europe; though in A. everything is on a more gigantic scale. Thus, one of these offsets, the peninsula of Arabia, is four times as large as France. On the w. extends the peninsula of A. Minor or Anatolia, divided from Europe by the Strait of Constantinople, the Sea of Marmora, and the Dardanelles, with the Black Sea on the n., and the Levant on the s. On the s. of A., the peninsular configuration may be divided into three principal masses, corresponding to the s. coast of Europe; Arabia may be considered as a counterpart to Spain; Italy, with its neighbor-island, Sicily, is represented by Hindustan and Ceylon; and, as in Europe, the broken Grecian peninsula is connected with A. by a bridge of numerous islands extending on the s.e., so in A., the Eastern Peninsula (or India beyond the Ganges), lying between the Bay of Bengal and the Chinese Sea, is connected with Australia on the s.e. by the vast Eastern Archipelago. This world of islands is divided into the several groups of the Philippine Islands, Borneo, Celebes, Molucca Islands, Sumatra, and Java, Timor and the numerous adjoining isles. The e. coast of A. is characterized by the deep indentations of the Pacific Ocean in the

Chinese Sea, Yellow Sea, and Sea of Japan, Okhotsk, and Kamtchatka; all fringed with numerous islands, and separated by the peninsula of Corea, the island of Saghalien, and the peninsula of Kamtchatka. On the n., the Siberian coasts are also deeply indented; but rather by the embouchures of large rivers than by arms of the sea. The whole length of continental A., from the Dardanelles to the Japan Islands, is 6,000 m.; its breadth, from Malacca to the n.e. cape of Siberia, is 5,300 m.; with its islands it extends from 10° s. lat. to 78° n., and from 26° e. long. to 190° e. or 170° w.

Vertical Configuration.—Equally grand are the features of this continent when regarded vertically: it has the most extensive lowlands, the most immense table-lands, the highest chains of mountains, and the most elevated summits in the world; tracts doomed to everlasting snow or scorching sterility, salubrious valleys of continual verdure, and noiseome jungles of the rankest growth. The table-lands of Asia occupy two-fifths of the whole continent. The eastern extremity is 2,000 m. broad; the western, less than 1,000. The whole mass may be regarded as consisting of two parts, separated, or, to speak more properly, perhaps, connected by the lofty, snow-covered mountain-isthmus of the Hindu Kush. These great divisions are styled respectively: 1. The Eastern Plateau, including the Table-land of Tibet and the Desert of Gobi; 2. The Western Plateau, or Table-land of Iran. The former, a vast four-sided mass, considerably larger than the whole area of Europe, extends 2,800 m. from the mountain chain, Hindu Kush, to the Tonquin Gulf in China. On the south, the plateau is divided from the plains of Hindustan by the Himalaya Mountains, which have a mean height of 18,000 ft., while several of their summits rise 25,000–29,000 ft. above the level of the sea. Even the passes over this enormous range of mountains are almost as high as the summit of Mont Blanc. Here Dhwalagiri, long supposed to be the Mont Blanc of the Himalayas, and with precisely the same signification, viz., 'white mountain,' rising to 26,826 ft., leaves all the peaks of the Andes far below; while Kunchinjinga reaches to 28,156 ft., and Mount Everest, now believed to be the loftiest summit in the world, attains the height of 29,002 ft. Cultivation is found at 10,000 ft. above the sea; while flocks graze some 4,000 ft. higher. In Eastern Tartary and Tibet, the ground is cultivated at a height only 2,000 ft. lower than the summit of Mont Blanc. On the e., the table-land of Tibet is bounded by the Chinese mountain-ranges Yunling and Khing-khan, which, towards the s., are connected with wild Chinese alpine regions of which little is known; while, towards the n., they extend into another mountainous region, where the eastern chain of Shangpe-shan opposes to the Pacific Ocean a wall of rock 3,000 ft. high. On the north, the chain of the Altaï Mountains, forms the boundary between the great plateau and the plain of Siberia.

The Western Plateau, or Table-land of Iran, rises gener-

ally about 5,000 ft. above the sea; but in some parts to 7,000 ft.; descending, however, to 2,000 and 1,200 ft. in the central and southern parts, where it spreads out into sandy and gravelly plains. It has been divided into three sections: the Plateau of Iran proper; the Median-Armenian Alpine region; and the Anatolian Table-land. The *first* division, or the Plateau of Iran, has a mean altitude of about 3,000 ft. Salt plains, with gravel and sand, form large portions of the surface, and mountain-walls on all sides hem it in. On the n. edge stand the Persian mountains; on the e. are the steep and lofty parallel chains of the Indo-Persian boundary mountains; and on the s., the plateau, for 1,000 m. along the Persian Gulf and Arabian Sea, is bounded by the wild terraced regions of Beloochistan and Farsistan. The *second* division, or the Median-Armenian Alpine region, includes the mountainous regions of Armenia, Kurdistan, and Azerbijan. Here the table-land is compressed to about half its general width. From this plateau, of which a part is mentioned in Scripture as 'the mountains of Ararat,' rises the volcanic cone commonly styled Mount Ararat, to the height of 17,212 ft. above the sea. Anatolia, the *third* and most westerly division of the table-land, is bounded along the shores of the Black Sea by mountains rising to 6,000 or 7.000 ft., and partly covered with forests; on the s.w., the Taurus chain of mountains, beginning in the islands of Rhodes, Cos, etc., extends in several ramifications through a part of Asia Minor, runs in a single range along the coast of Karamania, and in the e. has an occasional height of 12,000 and 13,000 ft.

The Western Plateau, thus divided into three sections, is full of diversities of soil and scenery. A great part of the table-land of Iran (or Persia) is extremely barren and arid, which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys here and there among the mountains. The coasts of the Persian Gulf are sandy wastes. Between Irak and Khorassan, a desert of clay, covered with salt and nitre, varied only by patches of verdure here and there, occupies 27,000 sq. m., and joins the wide sandy desert of Kerman. A great part of Beloochistan is an arid plain, covered with red sand.

Besides these central masses, there are several detached mountain chains and plateaus. The Ural Mountains, forming the land-boundary between Europe and Asia, and separated from the Altaï chain by salt lakes, marshes, and deserts, are divided into three sections: the Northern, Central, and Southern Ural. The second of these divisions is rich in minerals—gold, platina, magnetic iron, and copper. On the isthmus between the Black Sea and the Caspian, the alpine ridges of the Caucasus reach a height of from 10,000 to 11,000 ft., while individual peaks tower 17,000 or 18,000 ft., as, in the still faintly volcanic peak of Elbruz (18,493 ft.) and Kasbeck (16,523)—both, however, on the n. or European side of the main mass of the Caucasus. The high lands of Syria rise gradually from the neighboring deserts to the height of 10,000 ft. in Libanus and Antilibanus, and slope steeply in terraces

down to the narrow coast-lands of Phœnicia and Palestine. The plateau of the Deccan, in India, rises to an average height of from 1,500 to 2,000 ft., and is divided on the w. from the narrow coast-level of Malabar by the Western Ghauts, 4,700 ft.; on the e., from the broad level coast of Coromandel, by the Eastern Ghauts. On the n., it is divided from the low plains of Hindustan by the Vindhya and Malwah mountain-chains; and, on the s., the Ghauts unite at the sources of the Cavery, and form the Neilgherry (or Blue Mountains, 8,760 ft. high), the loftiest in the peninsular portion of Hindustan. These slope steeply down to a low narrow plain, then rise again to a considerable height in the Aligherry range, sink into the sea at Cape Comorin, and reappear in the group of Adam's Peak in Ceylon. The Malayan Mountains, or chain of the Eastern Peninsula, may be regarded as offsets of the Siue-shan, and extend to the extreme s. point of A., reappearing with volcanic peaks in the Sunda Islands.

The six great *Lowlands* of A. are, 1st, The *Siberian* lowland in the n., by far the largest. It stretches from the n. declivities of the Altaï and Ural Mountains to the shores of the Arctic Sea, and is, for the most part, cold, gloomy, and barren. 2d, The *Bucharian* lowland, or the wild sterile waste between the Caspian Sea and Lake Aral, much of it beneath the level of the sea. It is composed to a large extent of gravelly soil. 3d, The *Syrian and Arabian* lowland, the s. of which is hot and arid, with almost no oases; but the n. is watered by the Tigris and Euphrates. 4th, The lowlands of *Hindustan*, comprising the great Indian desert, 400 m. broad, together with the vast and fertile plains of Bengal, generally called the Valley of the Ganges, and ranking, perhaps, next to China as a region of fertility. 5th, The *Indo-Chinese* lowlands, comprising the long levels of the Burman empire, through which flows the Irrawady, and the rich regions of Cambodia and Siam. 6th, The *Chinese* lowlands, commencing in the e. at Pekin, and extending as far s. as the tropic of Cancer, containing 210,000 sq. m., an area seven times the size of Lombardy. It is watered by a copious river-system and numerous canals, and may be regarded as a vast garden, exceeding in productiveness all other parts of the world.

Hydrography. — The hydrography of A. displays as striking a variety as the structure of its land. The alpine regions send down in some directions torrents of water, which form rivers almost rivalling in magnificence those of America, and which flow for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide-stretching tracts, like the deserts of Africa, destitute of water, and doomed to eternal sterility. Only one large sheet of water, Lake Hamoon or Seistan (q.v.), refreshes the high table-land of Iran. The low steppe of Turan contains the Caspian Sea (q.v.), the largest of all lakes, and Lake Aral (q.v.). In the valley of Cashmere lies Lake Ular, 40 m in circumference, and the only considerable sheet of water in the Himalaya chain. At the

n base of this mountain chain, Lake Palte is remarkable for its annular form. In Tibet and the Altaï Mountains, lakes are very numerous.

One of the most striking characteristics of Asian river systems is found in its double rivers, or two streams rising in the same region, flowing in almost parallel directions, and either uniting, or nearly so, before entering the sea. Among these twin rivers may be mentioned—the Syr Daria and Amu-Daria, flowing into Lake Aral; the Euphrates and Tigris, in Western A., surrounding the plain of Mesopotamia, uniting at Koona, and together flowing into the Persian Gulf; the Ganges and Brahmaputra; and the Yang-tse-kiang and Hoang-ho, in China, rising near each other, then widely separated in their courses, but again approaching each other, and both falling into the Yellow Sea, only 100 m. apart.

The six great river-systems of A., comprising rivers (see their respective titles), are—the Mesopotamian, that of Northwest India, that of Northeast India and Tibet, the Indo-Chinese, the Chinese, and the Siberian. The *first* comprises the two famous streams, the Tigris and Euphrates. The *second* comprises the Indus with its tributaries. The *third* comprises the Brahmaputra and Ganges. The *fourth* comprises the rivers of the Indo Chinese peninsula; the chief of which are the Irrawady, the Martaban or Saluen, the Me-nam, and the Me-king or Cambodia The *fifth* system is the Chinese, comprising four great streams, all of which flow in an e. or n. direction into the Pacific; the Hong kiang, or Canton river; the Yang-tse-kiang (or Son of the Sea); the Hoang-ho, or Yellow river; and the Amur. The *sixth* comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena. They all have their sources in the Altaian Mountains; flow n , or nearly so; and for 800 or 900 m. before their embouchure, traverse a dreary, flat, monotonous waste, until their sluggish waters creep into the Frozen Sea.

Geology.—The geological structure of Asia is so complex, the different formations are so broken up and scattered, that a general description would be unintelligible. For the geological structure and phenomena of circumscribed districts, needful to a correct impression of the geology of Asia as a whole, see the separate titles. See INDIA: CHINA. TIBET, etc.

Natural History.—The vast extent of A., and its great diversities of climate, naturally lead to the expectation of a great variety of natural productions, both animal and vegetable. This expectation is heightened, by considering how completely this vast continent is divided into separate portions by mountain-ranges of great altitude, and how extensive the mountainous tracts themselves are, as well as the great extent of the elevated plateaus or table-lands, and when we add to these considerations that of the peculiar character of wide regions—wastes of sand—level steppes—and extensive districts of which the soil is strongly impregnated with salt. Accordingly, in both the flora and fauna of Asia, an immense variety appears.

The most northerly part of the continent, however, differs comparatively little in its productions from the corresponding parts of Europe and America. It exhibits the same arctic flora, with differences comparatively inconsiderable. Pines, birches, and willows form, as in the other continents, the last forests of the north; but upon account of the more severe climate, they do not reach a limit so northerly as in Europe, and particularly in the w. of Europe. Some of the common plants of Europe are abundant as far east as Kamtchatka: the Crowberry (*Empetrum nigrum*), so plentiful in the moors of Scotland, is still more plentiful throughout Siberia; the same *Vaccinia* (bilberries, etc.), and *Rubi* (brambles, etc.) abound in the Kamtchatkan forests as in those of Scandinavia. There are, however, interesting differences. Heaths are comparatively rare in Asia, its flora agreeing in this respect with that of America, rather than with that of Europe. The larch, which in Europe occurs only on the central mountains, extends far northward at the mouth of the Obi to the utmost limits of arborescent vegetation; probably a mere variety of the same species, although it has been described as distinct. In Kamtchatka, a different kind of birch replaces the common birch of Europe as a forest tree, and the Siberian stone pine is different from that of the s. of Europe. Siberia in its less frigid regions produces a luxuriant vegetation, of which herbaceous plants of unusually large size for a cold or temperate climate are a characteristic feature; as species of Rhubarb, Angelica, and Cow-parsnip (*Heracleum*), some of which are now well known in Britain. It is indeed from the central and eastern temperate parts of Asia that the cultivated species of rhubarb are derived, and from the same region the rhubarb root, valuable in medicine, is brought. In the abundance of *Grossulariaceæ* (currants), the warmer parts of Siberia resemble North America, though most of the species are different.

To the s. of the Altaian Mountains, the flora of Asia corresponds in part with that of the great eastern plain of Europe; but it exhibits also peculiarities which may in some measure be ascribed to the saline character of large districts, the stony or sandy desolation of others, and the elevation of the great central plateau. The flora of Asia Minor and of Syria has a general resemblance to that of the s. of Europe, although with features also which belong rather to that of India or of Africa. Shrubby *Labiatæ* are particularly characteristic of this region, from which not a few of them have found their way into the gardens of Europe and of other parts of the world, on account of their fragrance, their medicinal qualities, or their use for the grateful seasoning of food.—The tropical flora of Arabia abounds in trees which yield fragrant balsams and resins, particularly of the nat. ord. *Amyridaceæ*. Indeed, both the warmer temperate and the tropical regions of Asia excel other parts of the world in the number and variety of the odoriferous drugs which they produce, with odors of the most various characters, from myrrh and frankincense to asafetida. Arabia has long been noted for the production of coffee,

now extensively cultivated in other warm parts of A. The date-palm is as characteristic of Arabia as of Egypt. Acacias and mimosas also abound.—The flora of Persia in part resembles that of Arabia, though it is less tropical, and the height of its mountains gives it in some places a very different character.—The abundance of *Scitamineæ* is regarded as particularly characteristic of India; and plants of this order yield ginger, galangal, cardamoms, turmeric, and other articles of commerce, among which not the least important is a kind of arrow-root. Its *Leguminosæ* are also very numerous, both herbaceous and shrubby, or arborescent, many of them exhibiting great beauty of foliage and splendor of flowers; some producing useful kinds of pulse, others timber, gum, medicines, etc The number of valuable medicinal plants which belong to the Indian flora is very great, as is also that of dyewoods; and it abounds in fine fruits, of which the mango and mangosteen may be particularly noticed. *Cucurbitaceæ* (gourds) are very numerous; as are also trees of the genus *Ficus* (fig), some of which produce caoutchouc, and among which are the sacred peepul and the banian-tree, remarkable for the roots which descend from its branches to become new stems, and for the extent of ground which it canopies. Palms are numerous in the tropical parts of A., and particularly in its s.e. regions, but less numerous than in the tropical parts of South America. The cocoa-nut is one of the most common palms in the vicinity of the sea. Some of the Asiatic palms are valuable for the sago which they yield. The nat. ord. *Dipteraceæ* is one of those that are peculiar to India and southeastern A., and includes some of the noblest timber-trees; but the Indian teak, so valuable for shipbuilding, is of the order *Verbenaceæ*. The flora of the Eastern Peninsula, Siam, Cochin-China, and the s.e. of A. generally, differs considerably from that of India, and exhibits, if possible, a richer variety. The change from the Indian flora is still greater in the islands, and a resemblance to that of Polynesia and of Australia begins to appear. The bread-fruit takes the place of its congener, the jack of India. These regions produce nutmegs, cloves, and other spices. The *Lauraceæ* are abundant, yielding cinnamon, cassia, and camphor. Gutta percha has recently been added to the number of the most valuable exports. China and Japan have many plants peculiar to themselves, and are remarkable for the prevalence of the *Ternstræmiaceæ*, the nat. ord. to which the tea-plant and the camellia belong. It is scarcely necessary to mention how extensively tea is cultivated in China, and how important it is in the commerce of the world. The diversity of climate, however, both in China and Japan, is so considerable, as to imply no small diversity of productions. In like manner, the Himalaya Mountains have a flora very different from that of the Indian plains, and which in some of its most characteristic features, particularly in the prevalence of large rhododendrons and magnolias, has been found remarkably to agree with the flora of the southern part of the United States; while at still greater altitudes there is a strong resemblance to that of

more northern regions, or of the European Alps; forests of pines appear, and with them the *deodar*, a cedar scarcely, if at all, different from the cedar of Lebanon. The mountains of Java produce oaks and other trees resembling those of the temperate zone, although the species are peculiar. But many parts of A. have as yet been very imperfectly explored.

Many of the cultivated plants of Europe are known to be natives of A., and others are supposed to be so. As the cradle of the human race, and the scene of the earliest civilization, it is natural to suppose that it supplied the first fruits and other vegetable productions which man sought to improve by cultivation; and of some which, as the apple and the cherry, are probably natives of Europe, it seems probable that the first improved varieties were introduced from A. We do not know with certainty of what part of the earth some of the principal cereal plants or grains are natives—as wheat, barley, oats, and rye; but there seems great probability in the supposition that they are of Asiatic origin. Rice certainly is. It has been cultivated from time immemorial in some of the warm parts of A.; and its introduction into other quarters of the world is comparatively recent. Maize—introduced from America—is now to be reckoned among the most important cultivated plants of A., and its cultivation is rapidly extending, as is that of the potato. Wheat, oats, barley, rye, beans, pease, and buckwheat are the principal crops of regions similar in climate to those in which they are cultivated in Europe and America. Barley and buckwheat are cultivated in the Himalayas at the extraordinary elevation of almost 12,000 ft., and crops of barley are to be seen even 15,000 ft. above the sea. Millet of different kinds, durra, and other grains of inferior importance, are cultivated to some extent in India and other warm regions; also different kinds of pulse. The banana and plantain are of the same importance as in other tropical countries; and the yam and cocco or eddoes contribute largely to the supply of human food. The sugar-cane is cultivated in the warm parts of A., but not with so much spirit or success as in America, although it is a native of the East and not of the West Indies. Pepper is one of the native productions of the East Indies, and is extensively cultivated. Tobacco, whether or not any species of it is indigenous to A., is now produced in large quantities. Indigo is extensively cultivated in India, and the opium poppy too extensively. Different species of cotton are natives of India, and have long been cultivated there and in China. Hemp is cultivated in India, not for its fibre, but to afford the means of intoxication; and flax chiefly for the oil of its seeds; but both hemp and flax are extensively cultivated for their fibres in other parts of A.; and India and the other tropical regions produce many plants valuable for their fibres, among which are species of *Musa*, *Corchorus* (yielding the jute of commerce), and *Urtica* (nettle). Among the crops of India is sesamum, valued for the oil of its seeds.

It seems probable that we are indebted to the warmer temperate parts of A. not only for the orange, the lemon, and all the other species of the genus *Citrus*, but also for the olive, the peach, and nectarine, the apricot, the fig, the mulberry, and the vine, with many other of the fruits now most generally esteemed and cultivated. China and Japan being the seats of an ancient civilization, many useful plants have long been cultivated there, which have scarcely yet found their way into other parts of the world. Floriculture has been practiced there with great assiduity from a remote antiquity; and varieties of Hydrangea, Camellia, Tree Peony, Chrysanthemum, etc., have from time immemorial been scarcely, if at all, less numerous than those of the Tulip and Hyacinth in Holland.

The zoology of A. is not less interesting than its botany. Among domestic animals, the most important are the ox and buffalo, the sheep, the goat, the horse, the ass, the camel, and the elephant. A number of species of ox and buffalo are natives of A., from more than one of which the domesticated races appear to have derived their origin. Very distinct from all the others is the yak (q.v.) of Tibet, a creature which is of great use to the inhabitants of the elevated regions of the Himalayas, and is to them almost what the reindeer is to the Laplander. The sheep and goat are natives of the mountainous parts of Central A. The horse and the ass seem to belong to the same regions; and all of these have been domesticated from the earliest times. The camel is of incalculable value as a beast of burden in the regions of heat and drought, and as affording the means of traversing the great deserts. It is used principally in the s.w. of A. and in India. The elephant is a native of the tropical parts of A., but is of a different species from that of Africa. The reindeer constitutes the chief wealth of some of the tribes of the north. Dogs are also used by some of the Sibérian tribes for drawing their sledges. Different races of dogs are domesticated in different parts of A., and a small kind is fattened for its flesh in China; but in the Mohammedan parts of A., the dog is reckoned an unclean animal, and is known chiefly as a prowler about towns and villages, and a devourer of offal.

The tropical parts of A. abound in monkeys, of which the species are very numerous. Among them are some with long and some with short tails, but none with prehensile tails, like the sapajous of America. Many are altogether tailless, and among these is the orang-outang, found in the s.e. islands. A much larger ape, called the pongo, has been said to exist in Borneo, but it is still a doubtful species. The same warm regions abound in bats, many of which are of large size, and feed upon fruits, not upon insects. The flying lemur or colugo is another remarkable animal of the Indian Archipelago.—Bears are found in all parts of A.—the white bear in the extreme north, and other formidable species in the more temperate parts; while the tropical regions produce bears which are not ferocious, and feed chiefly on insects, fruits, and honey.

Badgers also are found in A., and quadrupeds of several other plantigrade genera, allied to the bear, but of comparatively small size and inoffensive habits, as the beautiful Panda (*Ailurus*) of the n. of India, and the Binturongs (*Ictides*) of Malacca and the neighboring archipelago.—Animals of the Weasel family (*Mustelidæ*) are numerous, among which the Teledu (*Mydaus meliceps*) of Java rivals the skunks of America in the horrible stench with which it surrounds itself for defense. More important are the sable and the sea-otter, pursued in the n. regions upon account of their furs.—Of the Dog family, or *Canidæ*, A. has not only wild dogs, but also wolves, foxes, hyenas, and jackals; the two former abounding chiefly in the colder, the two latter in the warmer regions. The arctic fox inhabits the most northerly shores and islands. The warmer parts of A. produce a number of species of the allied family of the *Viverridæ*, among which are the mangouste or Indian ichneumon—famous, like the Egyptian ichneumon, for the destruction of serpents—and the civet, from which is obtained a celebrated perfume.—Of feline animals, the most dreadful are the lion and tiger; the latter of which is peculiar to A., abounding in the warm regions of the s. and e., never extending westward beyond the mountains and deserts which separate India from Persia; but advancing far to the n., beyond the limits to which the lion advances, and even to the confines of Siberia. The leopard, the ounce, and many other cats, some of them large and dangerous, are found in A., especially in the warmer parts. Among them is the chetah, or hunting-leopard, tamed for the chase in India.—A few small marsupial (or pouched) quadrupeds (*Phalangers*) are found in the Moluccas, and form one of the links by which the natural history of A. is connected with that of Australia.—The *Glires* or *Rodentia*, on the contrary, are numerous in all parts of A., and many species are peculiar to it. Squirrels, marmots, rats, mice, hares, etc., are common in all except the most northerly regions. The brown rat, now so common in Europe, is said to have emigrated from Persia as recently as the beginning of the 18th c. Lemmings abound in Siberia and the Tatarian deserts, of which the jerboa is also an inhabitant. Porcupines are frequent in the warmer parts of A., and the beaver is found in the north.—Of edentate quadrupeds, the Pangolins (*Manis*) alone are Asiatic, and these are confined to the tropical regions.—Of *Pachydermata*, there are, besides the elephant, the horse, etc., already mentioned, several species of rhinoceros, wild boars, the babyroussa, and a species of tapir; all except the wild boar, natives of the warmest climates. One of the most interesting facts, however, connected with the natural history of A. is the abundance of remains of the mammoth, or fossil elephant, in the coldest parts of Siberia, its tusks still affording a considerable supply of ivory. Of ruminating animals, besides those of the ox-kind, already mentioned, and the sheep and goat, there are deer, antelopes, and musks or musk-deer. The reindeer and elk

are natives of Siberia; further s. the species of deer are much more numerous, and the same countries produce many species of antelope. The musks are found in the central and southern parts of the continent; one of them, a native of the highest mountains, yielding the much-prized perfume from which it derives its name.—A. has vultures, eagles, and other *Falconidæ*, owls, ravens, and other birds of the crow kind, herons, storks, cranes, etc, Swans, geese, ducks of various species, and many other *Anatidæ*, frequent its waters, some of them abounding even in the oldest regions. Albatrosses are very numerous on the Kamtchatkan shores; flamingoes on those of the more s. countries. Pigeons abound, and among them is the turtle-dove. The gouras of the Indian Archipelago are birds of the pigeon family, of which one species is almost as large as a turkey. There are many kinds of thrush, finch, warbler, bunting, sparrow, and other birds identical with or allied to those of Europe, among which is the nightingale, often mentioned by the Persian poets, and many, also, that are peculiar and characteristic, particularly in the warmer regions. Of these may be mentioned the splendid birds of paradise of the s.e. islands, peacocks, pheasants, etc. The gallinaceous birds of Asia are numerous, and from this continent was probably derived the domestic poultry of other parts of the earth. The abundance of the parrot tribe is a point of resemblance between the tropical parts of Asia and other tropical countries, but lories are peculiar to the East Indies. The ostrich inhabits the deserts of Arabia as well as of Africa. The cassowary is found in the s.e. islands. The edible swallows' nests of the East Indian coasts have long been celebrated.—Lizards and other saurian reptiles are very abundant in the warmer parts of Asia; and great crocodiles and gavials infest the rivers of the East Indies. Boas, pythons, and other great serpents are found in the tropical regions, which produce also many venomous serpents. The cobra da capello is one of the most dreaded. But the temperate parts of Asia also have venomous serpents, scarcely less dangerous. Some of the East Indian tortoises are remarkable for their great size, and turtles are found in the seas.—Both the salt and fresh waters of Asia produce many kinds of fish. The *Salmonidæ* of the rivers of Siberia supply an important part of the food of its inhabitants. The goldfish, now well known in Britain, is a native of China. Some of the fish of the tropical parts of Asia have attracted attention from the peculiarity of their form or habits. Insect life is exceedingly abundant in the warm parts of Asia, as in all other warm countries. Bees are numerous, and honey is produced in great quantities. Of other insects, it seems only necessary here to mention the silk-worm, introduced from Asia into Europe; and the locust, which sometimes devastates great tracts of the Asiatic countries bordering on the Mediterranean and the Black Sea, and occasionally extends its ravages into regions further west. Of molluscous animals, the pearl-oyster de-

serves particular notice, upon account of the important pearl-fisheries in different places.

Ethnography.—The whole population, consisting of 840,000,000 people, may be divided into the Mongolian, Aryan, and Semitic groups. The *first* of these includes all the peoples and tribes in the e., n., and s.e., of Asia; the *second* (see ARYAN) comprises the inhabitants of Northern India, Afghanistan, Persia, and part of Asiatic Turkey; the *third* includes the Syrian, Hebrew, and Arabian races. See ETHNOLOGY.

A further subdivision and classification may be made as follows: 1. The *East-Asian group*, including the peoples of Tibet, China, Japan, Corea, and the Indo-Chinese peninsula; all alike in the use of monosyllabic languages. This last people, however, must be subdivided into Western and Eastern, the former comprising the inhabitants of the Burman empire, Pegu, Laos, and Siam, having affinities with the Hindus; and the latter comprising the inhabitants of Tonquin, Cochin-China, and Cambodia, having affinities with the Mongolians of Tibet and China. 2. The *Tatar group*, including the Turkomans, Mongols, and Tungusians, who are spread over the whole table-land of Central Asia and the neighboring lands in the north. The Turkoman family is divided into three sections—the first including the east Turkomans, inhabiting Tashkend, Khiva, Balkh, and Usbekistan; the second including the so-called Tatars of the Urals and the neighborhood of Astrakhan and Kazan; the third including the Turks or Osmanli. With the exception of a few small tribes in Siberia, all the Turkish varieties are Mohammedans, use the Arabic alphabet, and employ numerous Arabic words in their dialects. 3. The *Siberian group*, including the Samoiedes, people of Kamtchatka, etc., speaking languages which have only recently been studied by philologists. 4. The *Malay-Polynesian group*, mixed with Australasian negritos, are spread over all the islands of Polynesia and the Indian Archipelago. The Malayan people of Java, Sumatra, Celebes, the peninsula of Malacca, the Sunda Islands, Moluccas, and Philippines, have an incipient literature, formed under Moslem and (since the 16th c.) under European influence. The South Sea islanders are clearly divided into two races by physical form, color, and language. One race is allied to the Australasian negrito, and the other to the Malayan. In most of the islands, there is a partial intermixture of the two races, but generally the distinction is obvious. It is probable that all the copper-colored Polynesians belong to the same family with the people of the Indian Archipelago. 5. The *Deccan group*, including all the people employing the Tamul, Carnatic, Telugu, and Singalese languages, all having a certain measure of civilization and a literature. 6. The *Indo-Germanic or Aryan group*, marked and subdivided by the three languages, Sanskrit, Persian, and Armenian. About thirty distinct nations, each having a peculiar dialect and literature, belong to the first subdivision; the second

ASIATIC ART.

1. Dancing Staff from Sumatra.
2. Head Covering from Luzon.
3. Hat from Borneo.
4-7. Articles from Samoa and Tonga Islands.
8. Bashkir Ornament.
9. Suit of Armor.
10. Armored Shoe.
11. Aino Quiver.
12. Mandarin's Staff in Red Lacquer.
13. Japanese Water Bottle.

includes the peoples of Beloochistan, Afghanistan, Persia, and Kurdistan; the third, the Armenians. All these families have literatures partly written in dead languages—the Sanskrit, Pali, Zend, and old Armenian. 7. The heterogeneous tribes inhabiting the Caucasus, whose affinities are not yet settled. 8. The *Semitic group*, including all the peoples whose languages are related to the Hebrew and Arabic.

Religions.—The same Asian characteristic of variety and wide contrast is found in the creeds as in the countries and tribes of people; the Brahminical religion of India, the doctrines of Buddha, Confucius, and of Lao-tse in China; the worship of the Grand Lama in Tibet; the creed of Islam in several varieties in Arabia, Persia, and India; the rude heathenism of the north; the various sects of native Christians in Armenia, Syria, Kurdistan, and India; the Greek Church in Siberia; these and other forms of religious profession show diversities and contrasts nearly as striking as those of Asian geography. Christianity, now the religion of Europe and America, owes its origin to Asia. For the existing religious systems of Asia, see MOHAMMEDANISM: INDIA (*Religion*). BUDDHISM: LAMAISM: etc.

Civilization.—The number of people civilized—in the Asiatic sense of the word—is far greater than that of wild and nomadic hordes; but culture here, when arrived at a certain point, assumes a stationary character, widely differing from the restless intellectual activity and industrial progress of Europe. The laws of states, families, industry, commerce, art, and science are in India and China so many branches of one fixed and permanent religious system, which has maintained its sway through many centuries, and would long remain unchanged, if left undisturbed by European influence. The Arabs, Persians, and Turks, collectively known as the Easterns, are distinct in civilization from the Hindus and Chinese. The institution of slavery among the former, of *caste* among the Hindus, and the civil and political equality of China, are distinguishing marks. The Turk is a monotheist and fatalist; the Hindu is either a mystical pantheist or polytheist, acknowledging a multitude of gods; the Chinese is rather a utilitarian moralist.

Industry.—The industry and commerce of the Asiatic continent bear no adequate proportion to its capabilities: see the titles of the different countries.

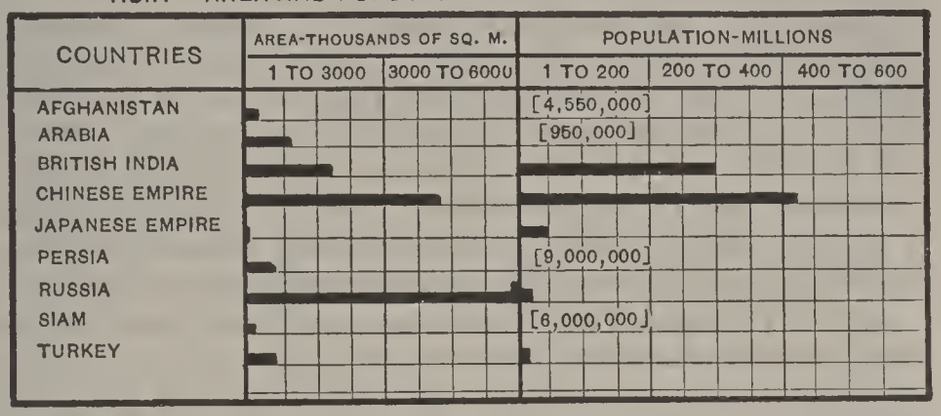
Political Aspect.—The political institutions of A present some striking contrasts. While the barbarous hordes in the n. live almost without the idea of government, and scarcely know that the Russian czar claims them as his subjects; and the nomadic tribes, under their khans or sheiks, have a sort of patriarchal government, subordinate to higher powers; monarchy and despotism have existed in their extreme forms among the more cultivated nations. The government of China is an absolute monarchy in form, but, in fact, is strictly limited by the force of tra-

dition. The emperor is apparently unlimited in authority; but it is an essential duty of an emperor to rule exactly according to the precepts handed down by his ancestors. Reverence for ancestors and their institutions is, therefore, the sole presiding and conservative principle which has so long preserved the great Chinese empire from political changes. A., now so passive, anciently was active in the great movements of the world's history; contended against Egypt and Greece, and afterwards contributed to the greatness and glory of the Macedonian and Roman empires. From the n. of the Caspian Sea, came the vast hordes of the Huns who spread themselves abroad over Europe. The armies of Genghis Khan and Tamerlane overran the Slavonian plains, while the Arab caliphs, with their fanatical troops, established their religion and government in three-quarters of the world. Under the Osmanli fell the eastern Roman empire, and still the Turk maintains a political position in Europe, though a position now becoming very feeble and insecure. In proportion as Europe has advanced, A. has declined in political power, so as to countenance the theory of a gradual movement of the spirit of civilization and progress from the eastern to the western world. As soon as the Asiatic nations have reached a certain moderate pitch of culture, the history of civilization ceases so far as they are concerned, and is followed by the mere chronology of states and dynasties. It appears that all great future changes in the destinies of the peoples of Asia must proceed from European impulses. When Portuguese ships had rounded the Cape and so reached India, a new era of Asian history began. The Portuguese, the Spaniards, Dutch, French, Danes, and English planted their standards on Indian soil. The English speedily extended their dominion here, and soon overshadowed all the other European powers; though the Portuguese and French still maintain their footing in Hindustan, and the French, the Spaniards, and the Dutch own large territories in Further India or the Indian Archipelago. Lately England has increased her influence in the extreme w. of Asia; having secured the occupation of Cyprus, while guaranteeing the defense of the Asiatic dominions of the Porte. Meanwhile Russia has extended her sway over Siberia, Caucasia, and Turkestan; securing thus the keys of China and the approaches to Persia. Even in some of the nominally independent powers, European influence is very powerful; the throne of Persia, for example, is surrounded by European diplomatists. And while Russia and Britain are striving to share between them supremacy in Asia, the French and the Americans have a large share of the commerce of the eastern coasts.

The area and population of nine leading countries in Asia appears on the following diagram. Russia, as shown in this statement, is Russia in Asia, and it will be noted that it has by far the largest area in the group; next comes the Chinese Empire with an area of more than 4,000,000

square miles, then British India with an area approximating 2,000,000 square miles. The total for British India embraces India Proper, Burma, Baluchistan, Ceylon and the Straits settlements. The Chinese Empire is the largest in population, British India being second and the Japanese Empire third. Asia is the largest of the great natural divisions of the globe, containing one third of all the dry land known, and extending from the Arctic Circle to the Equator, and over 165° of longitude.

ASIA — AREA AND POPULATION OF PRINCIPAL COUNTRIES.



ASIA, CENTRAL: term usually applied in its geographical sense to the region between the Altai Mountains and the Persian Gulf, including part of Siberia, all Turkestan, Afghanistan, Baluchistan, and part of Persia. An eariler usage—that of Humboldt—gave this name to the khanates of Bokhara and Independent Tartary. In Russia official language, Central Asia is an administrative division of the empire lying to the s.w. of Siberia, and comprising, with part of what used to be called Siberia, the recent Russian annexations in Turkestan. Russian Central Asia is divided into the governments of Akmollinsk, Semipalatinsk, Turgai, Uraisk, Semiretchensk, Syr-Daria, Sarefchan, Kuldja, Amu-Daria, the Trans-Caspian territory, and Ferghana. The total area is stated at 1,227,000 sq. m.; pop. 4,490,000.

A'SIA MI'NOR: ancient name of what is now called Anatolia (q.v.). Here, in Ionia, was the early seat of Grecian civilization, and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, etc., with Troy, Ephesus, Smyrna, and many other great and famous cities. Here, from the obscure era of Semiramis (about B.C. 2000), to the time of Osman (about A.D. 1300), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians; of the Romans with Mithridates and the Parthians; of the Arabs, Seljuks, Mongols, and Osmanlis with the weak Byzantine empire.

ASIARCH, n. *ā'shĭ-ärk* [Gr. *asiarchēs*]: under the Romans, the director-general of religious ceremonies in the province of Asia. The expression occurs in Acts

xix. 31, 'And certain also of the Asiarchs.' Properly speaking, there was but one A. residing at Ephesus, the others referred to being his subordinates.

ASIDE, ad. *ă-sīd′* [AS. *a*, on, and *side*]: to one side; apart from the rest; at a little distance from the straight line: N. in a *drama*, a speech made by one actor and supposed not to be heard by the rest. To SET ASIDE, to annul the effect of, as a verdict or judgment of a court of law; to place away for a future occasion or special purpose.

ASILIDÆ, n. *ă-sĭl′ĭ-dē:* family of *Diptera*, generally called Hornet-flies. They are fierce and voracious, usually feeding on insects which they catch on the wing. In flying, they make a humming noise; at rest, sit on top of plants. All are harmless to man. ASILUS, genus.

ASIPHONATE, a. *ă-sīf′ŏ-nāt* [Gr. *a*, without; *siphōn*, a siphon]: not possessing a respiration tube or siphon; applied to a division of the lamellibranchiate mollusks.

ASITIA, n. *a-sĭsh′ĭ-ă* [Gr.—from *a*, without; *sitos*, wheat food]: in *med.*, loss of appetite, loathing of food.

ASK, v. *ăsk* [AS. *acsian:* Ger. *heischen*, to inquire, to demand: Dut. *eischen:* Icel. *æskia*, to demand, to require]: to beg; to solicit; to seek from; to question; to inquire. ASK′ING, imp. ASKED, pp. *ăskt.* ASK′ER, n. one who.—SYN. of 'ask': to request; beg; beseech; supplicate; entreat; implore; solicit; crave; adjure; interrogate; seek; petition; require; demand; claim; inquire.

ASKANCE, ad. *ăs-kăns′* [It. *schiancio*, athwart, across; *scansare*, to turn aside: Dut. *schuin*, aslant: OF; *a scanche*, obliquely]: sidewise; looking toward one corner of the eye. ASKANT, ad. *ăs-kănt′*, obliquely; on one side.

ASKEW, ad. *ăs-kū′* [Icel. *skeifr:* Ger. *schief*, oblique, wry: Icel. *á ská*, askew: L. *scævus*, on the left hand]: awry; obliquely; aside.

AS′KEW, or AS′COUGH, ANNE: d. 1546, July 18: one of the sufferers for Protestant opinions at the dawn of the Reformation in England. Having embraced the views of the reformers, she was turned out of doors by her husband, a gentleman of Lincolnshire, a zealous Rom. Cath. On this she went up to London to sue for a separation; but was eventually arrested on a charge of heresy, and was examined by the Bishop of London and others on the doctrine of transubstantiation, the truth of which she denied. After further examination and torture by the rack, she was burned at the stake, in Smithfield.

ASLANI, n. *as-lā′nĭ* [Turk. and Tart. *aslan*, *arslan*, a lion]: old Turkish coin worth from 115 to 120 aspers (q.v.). The name is sometimes applied to the Dutch dollar in the Levant.

ASLANT, ad. *ă-slănt′* [AS. *a*, on, and *slant:* Scot. *asklent*, askew: OF. *esclincher*, to slip]: not at a right angle; on one side; leaning toward.

ASLEEP, ad. *ă-slēp'* [AS. *a*, on, and *sleep*]: in a state of sleep; at rest.

ASLOPE, ad. *ă-slōp'* [AS. *a*, on, and *slope*]: in a sloping manner or position.

ASMANNSHAUSEN, *âs'mâns-how'zėn:* village in the jurisdiction of Rüdesheim, Nassau; famed for the wine produced on the slate-mountains in its vicinity. Of this there are two kinds, red and white, the former greatly preferred. It has a rich red color, like Burgundy; possesses a rare aromatic flavor; and is noted for its uncommon strength and fire. But it retains its excellent qualities only about three or four years; after which, year by year, it becomes weaker, and loses its color. The choicest sort, preferred by connoisseurs to all the other red wines of the Rhine, and even to Burgundy itself, is cultivated in the ducal vineyards at Wiesbaden.

ASMATOGRAPHY, n. *ăs-mă-tŏg'ră-fĭ* [Gr. *asma*, a song; *graphē*, a writing]: a writing or treatise on songs.

ASMODEUS, *ăz-mo-dē'ŭs* (properly, ASCHMEDAI, 'the destroyer'): an evil genius or demon mentioned in the later Jewish writings. A. was described as the author of many evils. In the book of Tobit (q.v.), he is represented as slaying the seven husbands of Sara, and hence, in modern times, has been jocularly spoken of as the destroying demon of matrimonial happiness. In the Talmud, A. is described as the prince of demons, and is said to have driven Solomon from his kingdom.

ASMONEAN, or ASMONÆAN, a. *ăs'mō-nē'ăn:* pertaining to the Asmoneans, a family that reigned over the Jews 126 years, till B.C. 39. See MACCABEES.

ASO'CA, (*Jonesia Asoca*): Indian tree of the nat. ord. *Leguminosæ*, sub-order *Cæsalpineæ;* remarkable for the beauty of its red and orange flowers. The leaves are abruptly pinnate, shining, and very beautiful. The A. is often mentioned in Indian poetry, and is connected also in various ways with the Hindu mythology.

ASO'KA, or ASHO'KA, or DHAR-MA-SO'KA: an Indian king, who lived B.C. 3d c.; called the 'Buddhist Constantine,' having organized Buddhism as the state religion. As king of Magadha or Behar, A. became a zealous convert to Buddhism abt. B.C. 257, and in 244 he convened the third of the great Buddhist councils at Patna. Throughout his kingdom and the conquered provinces he published the grand principles of the system; and the edicts by which these sermons were preached are still found graven deep on pillars, caves, and rocks from Peshawar and Kathiawar to Orissa. About 40 such rock inscriptions are still extant; but he is said to have erected 84,000 memorial columns. His civil organization and administration of justice were admirable.

ASOMATOUS, a. *ă-sŏm'ă-tŭs* [Gr. *a*, without; *sōmă*, a body; *sōm'ata*, bodies]: without a material body.

ASONANT, a. *ăs'ō-năn̆t* [Gr. *a*, without: L. *sonan'tem.* sounding]: without sound; not resonant.

ASOPIA, *ă-sō′pĭ-ă* [Gr. *Asōpos*, god of the river *Asopus* in Achaia]: genus of moths of the family *Pyralidæ*. *A. farinalis* is the so-called Meal-moth.

ASP, n. *ăsp*, or ASPIC, n. *ăs′pĭk* [OF. *aspe:* F. *aspic*, a kind of viper—from L. *aspis*, or *aspĭdem*, a venomous serpent]: a small serpent whose bite is fatal, the name of which has come down from ancient times; the vague descriptions of ancient authors, however, causing uncertainty as to the species. It is very generally supposed to be the *Naja Haje*, the El Haje or Haje Nasher of the Arabs, which is very common in Egypt, Cyprus, etc., and often appears in hieroglyphic and other sculptures as one of the sacred animals of ancient Egypt. It is sometimes from 3 to 5 ft. in length, of nearly equal thickness throughout, with a gradually tapering tail; brownish, varied with dark and pale spots; the scales of the neck, back, and upper surface of the tail slightly carinated; the tail about one-fourth of the whole length of the animal. The neck is capable of considerable dilatation, through the distension of its loose skin, although not so much as that of the nearly allied cobra da capello of India (*Naja tripudians*). The dilatation of the neck takes place when the serpent is irritated. The jugglers of Egypt are accustomed to perform tricks with this serpent, as those of India with the cobra da capello, causing it to dance to their music; after they have first, however, carefully extracted the poison-fangs. It is very venomous. Several varieties exist at the Cape of Good Hope, one of which is nearly white; and one is called Spuugh Slang, or Spitting Snake, by the colonists, from its supposed power of ejecting its poison to a distance when irritated; the poison which distils from the fangs in such circumstances being probably carried off by the forcible expirations which the creature makes—a characteristic, however, not exclusively belonging to a particular variety. —Other serpents of the same family, *Viperidæ*, are by some believed to be the true asp, particularly *Vipera Echis* and *V. Cerastes*. The former is a grayish or yellowish brown color, with rays and eye-like spots on the upper parts; it is found both in India and the n. of Africa. The latter is of a grayish color, and has a very broad heart-shaped head, a short, obtuse, rounded muzzle, and the superciliary or eyebrow scales remarkably developed, so that one of them is often produced into a sort of spine; it inhabits the deserts of n. Africa.—The name asp is now generally given to *Vipera Aspis*, a native of the Alps, found also in the s.e. of Europe and in Sicily, which much resembles the common viper, but is more slender, and has a larger head; it is also more venomous.

ASP, n.: see ASPEN.

ASPALATHUS, *ăs-păl′ă-thŭs* [Gr. *aspalathos*, a thorny shrub whose bark and roots yielded a fragrant oil—named from the island *Aspalathus*, where is grew; it has not been certainly identified]: ancient unidentified shrub; also a

plant called the Rose of Jerusalem, or Our Lady's Rose; in modern *bot.*, a genus of plants belonging to the order *Leguminosæ*, sub-order *Papilionaceæ*. It contains about 150 shrubs and under-shrubs.

ASPALAX, *ăs'pa-lăx* [Gr. *aspalax*, or *spalax*, a mole]: genus of *Rodentia* to which belongs the *A. typhlus* of Turkey, s. Russia, and Persia. It has no real affinity to our mole, which belongs to *Insectivora*.

ASPARAGIN, *ăs-păr'ă-jĭn*, $C_4H_8N_2O_3$: a crystalline substance which exists ready formed in the common asparagus, in the marsh-mallow, in comfrey, in potatoes, in chestnuts, in leaves of the deadly nightshade, in licorice-root, in the milky juice of lettuce, in the tubers of the dahlia, and in the shoots of vetches, peas, beans, wheat, etc. This substance is readily obtained from the expressed juice of the young shoots of asparagus, of young vetches, etc., which, after filtration and evaporation to a syrup, soon deposits it in crystalline prisms of a right rhombic form. These crystals dissolve freely in boiling water, the cooled solution having a faint and cooling taste, and a slight acid reaction. Asparagin exhibits two remarkable transformations. (1) When its aqueous solution is heated with alkalies or acids, it is decomposed into aspartic acid, $C_4H_7NO_4$, and ammonia; from this and other reactions, there is no doubt that it should be regarded, according to modern views, as the amide (q.v.) of aspartic acid. (2) While a solution of pure asparagine-crystals remains unchanged, if any albuminous matter be present the solution passes into fermentation, and the whole of the asparagine is converted, by the assimilation of hydrogen, from the ferment into succinate of ammonia, a reaction which may be expressed as follows:

Asparagin. Succinate of Ammonia.

$$C_4H_8N_2O_3,H_2O+H_2=2NH_3,C_4H_6O_4$$

Like most of the amides, this substance unites both with acids and alkalies, but the resulting compounds are of little general interest. That asparagine plays an important part in the physiology of plants, is obvious from its wide distribution.

ASPARAGUS, n. *ăs-păr'ă-gŭs* [L.—from Gr. *aspar'agos*]: a well-known plant, whose turios or young shoots are used at table; the cultivated *Aspar'agus offic'ina'lis*, ord. *Liliă'cĕæ*. ASPARAGINOUS, a. *ăs'păr-ăj'ĭ-nŭs*, eaten like asparagus. ASPARAGIN, n. *ăs păr'ă-jĭn*, or ASPAR'AMID, *-mĭd*, a crystalline substance obtained from asparagus. ALPAR'AGUSSTONE, a translucent mineral of a greenish-yellow color, sometimes passing into a wine color. See APATITE. ASPAR'TIC ACID, an acid obtained from asparagine.

ASPAR'AGUS: genus of plants of the nat. ord. *Liliaceæ*, having an almost bell-shaped six-partite perianth upon an articulated stalk, six stamens, one style, with three recurved stigmas, and the cells of the berry two-seeded. The species of this genus are herbaceous or shrubby plants, natives chiefly of the s. of Europe and of Africa, with

abortively diœcious flowers; the stem is unarmed in some, in others thorny; at its first sprouting leafless, and covered with scales at the top; afterwards very much branched, with numerous fasciculate, generally bristle-like leaves. The most widely diffused species is the Common A., *A. officinalis*, a native of Europe, which grows on the banks of rivers and on the seashore, in meadows and bushy places, especially in sandy soils, and it is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, being a much esteemed article of food, though in only a slight degree nutritious. These sprouts contain a peculiar crystalline substance, called *Asparagine*, (q.v.) and have a specific action on the urinary organs, so that their long continued use in very large quantities is apt even to produce bloody urine. They are no longer retained in the pharmacopœia, but both the shoots and roots of A. are still occasionally used as a diuretic in dropsies, and as a lithic to dissolve urinary calculi. A. was grown by the ancient Romans, but has been greatly improved by cultivation. It is propagated usually by seeds which may be sown where the crop is to be produced, though transplanting in the spring after sowing is usual. The ground should be deeply trenched or plowed and a very heavy coating of manure incorporated with the soil. Rather light, sandy ground is preferred. Plants may be set in spring or fall, in rows 2–3 ft. apart and 9 in. apart in the row, and should be kept free from weeds. In cold regions, on the approach of winter, the ground should be covered with stable manure to the depth of 3 or 4 in., which should be forked into the ground early in the spring. Cutting can be commenced in three or four years from sowing the seed, and the bed should remain productive 20 years. There are about a dozen varieties.—The A. beetle (*Crioceris asparagi*), introduced from Europe about 1860, is often very destructive. Hand-picking, letting domestic fowls run among the plants, the use of pyrethrum powder, and destroying all A. plants except those required for shoots, are the principal remedies.—A kind of spirit is sometimes made from A. seed, and the berries form a substitute for coffee. The shoots of several other species also are eaten, as those of *A. tenuifolius*, *A. acutifolius*, and *A. albus*, natives of the s. of Europe. On the other hand, the sprouts of the Bitter A., *A. scaber*, which is very similar to the Common A., are uneatable on account of their great bitterness. Climbing A. with exquisite feathery leaves is cultivated as an ornamental plant.

ASPASIA, *ăs-pā′shĭ-a* [Gr.—from *Aspasia* (q.v.), or *aspazomai*, to welcome kindly]: genus of plants belonging to the order *Orchidaceæ*.

ASPASIA, *ăs-pā′shĭ′â:* B.C. 5th c.: one of the most remarkable women of antiquity; b. Miletus, dau. of Axiochus. The fact that in Athens all foreign women, whatever their character, were equally esteemed, or rather disesteemed, and that their children, even when begotten in wed-

lock, were held illegitimate, has originated the erroneous notion that A. was a courtesan. She certainly broke through the restraint which confined Athenian matrons to the seclusion of their own homes; for after her union with Pericles, who had parted from his first wife by her own consent, her house became the rendezvous of all the learned and distinguished people in Athens. Socrates often visited her. Her eloquence and knowledge of politics were extraordinarily great. Her husband—though, strictly speaking, the Athenian law would have refused this appellation to Pericles—was honored with the title of Olympian Jove, while she herself was dignified with the name of Juno. From the comic writers and others, she received much injustice. It was Hermippus, the comic poet, who took advantage of a temporary irritation of the Athenians against Pericles, to accuse A. of impiety; but the eloquence of the great statesman disarmed the enmity of the judges, and procured her acquittal. Her influence over Pericles must have been singularly great, though it has obviously been exaggerated, and even caricatured. The brilliant but not historically accurate Aristophanes charges her with the origin both of the Samian and Peloponnesian wars, the latter on account of the robbery of a favorite maid who belonged to her. Plutarch vindicates her against such accusations; and Thucydides, who details minutely the causes of the Peloponnesian war, does not mention her name in connection with these. After the death of Pericles, A. married Lysicles, a cattle-dealer (an important, lucrative, and dignified profession in ancient times), who, through her influence, soon became an eminent man in Athens. The name of A. was, after her death, applied to many women of remarkable accomplishments and amiability.

ASPASIOLITE, *ăs-pā′zĭ-o-līt* [Gr. *aspasios*, greatly welcomed]: a mineral of a green or grayish color. It occurs in Norway with iolite, of which it may be only an altered state.

ASPE, *âs′pā:* t. of Valencia, Spain, province of Alicante; 21 m. w. from Alicante, near the river Elcha. It is moderately well built, but the streets are narrow and winding. It has numerous flour-mills and oil-mills, also soap-manufactories and brandy distilleries. There is considerable trade in wine. Pop. 6,744.

ASPECT, n. *ăs′pĕkt* [L. *aspectus*, looked at attentively—from *ad*, *specto*, I look]: that which looks toward; looks; appearance; position or situation; view. ASPECT′ABLE, a. that may be looked at or beheld.

AS′PECTS, in Astronomy: certain positions of planets with respect to one another, as seen from the earth. In the days of astrology, there were five Aspects—Conjunction (indicated by the symbol ☌), Sextile (⚹), Quartile (□), Trine (△), Opposition (☍). Two planets are in conjunction when they have the same longtitude; the aspect is sextile when they are 60° apart; quartile, when the distance

is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these A. great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition.*

ASPEN, n. *ăs′pĕn,* or Asp [AS. *æspen:* Icel. *ösp,* aspen]: a tree of the poplar kind whose leaves quiver or shake at the slightest breath of air; the *Popŭlus tremŭla,* ord. *Salĭcācĕæ:* Adj. pertaining to an aspen.

AS′PEN, or Tremulous Poplar (*Pop′ulus trem′ula,* see Poplar): tree frequent in Europe and in Siberia. It is a native of Britain, and is frequent in Scotland, where it is found even 1,500 ft. above the sea. It has received the specific name *tremula,* from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen-leaf has become proverbial. The leaves are nearly orbicular, but broadly toothed, so as almost to exhibit angles. The footstalks are compressed, which favors the readiness of motion. It grows quickly, with a straight stem, reaching to a height of from 60 to 80 or even 100 ft. In unfavorable situations, it becomes dwarfish. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning-lathe, and especially for being made into troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem be peeled and allowed to dry before it be cut down, the wood becomes harder, and is then capable of being used as timber for the interior of houses; and on this account the tree is of great importance in many districts, and the more so as it succeeds in any soil, although it prefers one which is moist and gravelly. The bark contains a great quantity of a bitter alkaloid, *Salicin.* The charcoal made from this tree can be used in the manufacture of gunpowder.—*Populus tremuloides,* a similar species, native of N. America, is called the American A. It is regarded by some as a mere variety. Very similar, also, is another N. American species, *P. grandidentata,* ovate, large-toothed leaf, instead of cordate. It is a tall tree, often reaching 75 feet, and has bluish or rusty-white leaves thicker and larger and with more spreading teeth than the two former species.

ASPER, n. *ăs′pēr* [L. L. *asperus, asprus, asperum, asprum:* mod. Gr. *aspros,* white: Turk. *aqtscheh, aktsche,* white—used substantively as the name of a coin]: an old Turkish silver coin, worth a little more than one cent.

ASPERATE, v. *ăs′pėr-āt* [L. *aspĕrātus,* made rough—from *asper,* rough]: to make rough or uneven. As′perating, imp. As′perated, pp. Asperation, n. *ăs′pėr-ā′-shŭn.* Asper, or Aspre, a. *ăs′pėr,* rough; sharp in sound; bitter in spirit: N. the rough breathing (′) placed over the initial letter of many Greek words, when that letter is a vowel, and over the second letter if a diphthong. It indicates that the vowel is to be aspirated, i.e., pronounced as if *h* preceded it. It is used also before *p* at the

beginning of a word, to indicate that it should be pronounced like *rh.*

ASPERGES, n. *ăs-pėr'jēs* [L. *asper'ges,* first word of prayer from Ps. li. 7, '*Thou shalt sprinkle* me, O Lord, with hyssop,' etc]: formula sung in the *R. Cath. Ch.* by the priests while sprinkling holy water over the congregation, or over the sick; the instrument by which this is done, consisting of a broad brush with a handle. See ASPERGILL.

ASPERGILL, n. *ăs'pėr-jĭl,* or ASPERGILLUS, n. *ăs'pėr-jĭl'lŭs* [L. *aspergo,* I scatter or throw]: in the *R. Cath. Ch.* a short staff surmounted by a brush for sprinkling holy water. AS'PERGIL'LIFOR'MIS, a. *-jĭl'lĭ-fŏrm'ĭs* [L. *forma,* shape]: in *bot.*, applied to little tufts of hair which assume the form of a brush.

ASPERGILLUM, *ăs'pėr-jĭl'lŭm:* remarkable genus of Lamellibranchiate Conchiferous Mollusca, in which the shell has the form of an elongated cone, terminating at the larger end in a disk, which is pierced with numerous small tubular holes, the little tubes of the outer range being largest, and forming a sort of ray around it. The animals of this genus are borers, some of them living in sand, others burrowing in stone, wood, or thick shells. *A. Javanum* is popularly called the Watering-pot, and the same resemblance has suggested the name A. (from the Latin *aspergo,* to sprinkle). The most interesting feature in the structure of the shelly tube of A. is the presence of two small valves, incorporated in the substance of the tube, to which they bear a very small proportion. 'They there form the stamp,' says Owen, 'of its true affinities, but subserve as little any ordinary final purpose as the teeth buried in the gums of the fetal whale. The affinities are with mollusca inhabiting bivalve shells. A rudimentary bivalve shell is found, in like manner, cemented into the shelly tube of the fossil *Teredina,* which bored the drift-wood of the London clay.

Aspergillum.
a, the disk with holes; *b*, the rudimentary valves.

There is also a genus ASPERGILLUS in Botany containing many of the small fungi commonly known by the name of mould (q.v.), which occur on decaying substances of various kinds. Some of the species are peculiar to diseased animal tissues.

ASPERGILLUS: genus of fungi comprising many of the species of common molds.

ASPERIFOLIÆ, *ăs-pĕr-ĭ-fō'lĭ-ē* [L. *asper,* rough; *folium,* a leaf]: Linnæus's name for the natural order of plants now called *Boraginaceæ,* or Borageworts.

ASPERIFOLIOUS, a. *ăs'pėr-ĭ-fōl'ĭ-ŭs,* or ASPERIFO'LI-

ATE, *-āt*, [L. *asper*, rough; *fo'lĭum*, a leaf]: having leaves rough to the touch.

ASPERITY, n. *ăs-pĕr'ĭ-tĭ* [F. *aspérité*, roughness—from L. *asperĭtas*, roughness—from *asper*, rough]: roughness of surface; the quality that grates on the ear; sourness; harshness.—SYN. of 'asperity': acrimony; animosity; tartness; harshness; moroseness; crabbedness; sourness; sharpness.

ASPERMOUS, a. *ă-spĕr'mŭs* [Gr. *a*, without; *sperma*, seed]: in *bot.*, without seed.

ASPERN, *ăs'pĕrn*, or GROSS ASPERN: village of Austria, on the left bank of the Danube, 5 m. e.n.e. of Vienna. Pop. abt. 700.

This and the neighboring village of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army under Napoleon I. and the Austrians under Archduke Charles. After the battle of Eckmühl, in which the Austrians were defeated, the archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. The French army entered Vienna, 1809, May 12, when the archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, and on the 21st the French army began crossing to the attack. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of A., a terrible conflict, the grand object of the contending hosts being the possession of the villages. At the close of the day, it remained undecided; but next morning it was renewed with fury on either side, when, after terrible slaughter Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterwards slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4,000 killed and 16,000 wounded; that of the French at double that amount. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins.

ASPERNATION, n. *ăs-pĕr-nā'shun* [L. *aspernatio*—from *ab*, from; *spernor*, to despise]: contempt; disdain.

ASPEROLITE, *as-pĕr'o-līt* [L. *asper*, rough: Gr. *lithos*, stone]: a variety of chrysocolla (q.v.) It is a very brittle mineral, of a bluish-green color, found in Tagilsk, Russia.

ASPERSE, v. *ăs-pĕrs'* [L. *aspers'us*, besprinkled]: to sprinkle over; to cover all over with evil reports; to slander. ASPERS'ING, imp. ASPERSED, pp. *ăs pĕrst'*, slandered. ASPERS'ER, n. *-ĕr*, one who. ASPERSION, n. *ăs-pĕr'shŭn*, a sprinkling, as with dust or water; the act of spreading foul and slanderous reports. ASPERSORY, a. *ăs-pĕr'sĕr-ĭ*, defamatory. ASPER'SIVE, a. *-sĭv*, involving aspersions; calculated to asperse. ASPER'SIVELY, ad. by way of aspersion.—SYN. of 'asperse': to slander; detract; defame; calumniate; vilify; vilipend.

ASPERSORIUM, n. *ăs-pėr-sō′rĭ-ŭm* [L.L. *aspersorium:* Ital. *aspersorio*]: the stoup, or holy-water basin, in mediæval churches; the aspergill (q.v.).

ASPERUGO, *ăs-pėr-ū′gō* [L. a plant with prickly leaves —from *asper*, rough]: genus of plants belonging to the order *Boraginaceæ*. It contains only one species, *A. procumbens*, or German Madwort, a very hispid plant, with solitary blue flowers in the axils of the leaves.

ASPERULA: see WOODRUFF.

ASPETTI, *âs-pĕt′tē*, TIZIANO: 1565–1607: b. Padua; d. Pisa: sculptor, said to have been a nephew of the painter Titian. This, however, is doubtful, as Titian was born in 1477. A. worked at Venice, Padua, Florence, and Pisa. Vasari calls him the Titian of Padua, and praises his work highly. A statute of St. Anthony at Padua, and statues of Sts. Peter and Paul on the facade of St. Mark's Church at Venice, are among his works.

ASPHALT, or ASPHALTUM, n. *ăs-fălt′* or *ăs-făl′tŭm* [L. *asphaltum;* Gr. *asphaltos*, bitumen—from Gr. *a*, not; *sphallo*, I cause to slip]: a compact form of bitumen (q.v.); a blackish or dark-brown substance of solid consistence. ASPHALTIC, a. *ăs-făl′tĭk*, pertaining to asphalt. ASPHALTING, process of covering or of paving with asphaltum. ASPHALTENE, black inflammable compound formed by oxidizing petrolene.—*Asphalt* is commonly called mineral pitch, being a compound of hydrocarbons of the same series as petroleum. The specific gravity of A. is slightly greater than that of water. It is found in many places, and of various consistency, being frequently mixed with limestone, sandstone, clay, sand and earth. When hardened and mixed with limestone or the like it is known as bituminous rock or bituminous limestone. Certain United States deposits are maltha, gilsonite and mineral tar. The largest deposit of A. is in the Pitch Lake, on the Island of Trinidad. There exists another large lake in Bermudez, Venezuela, and there are considerable deposits in Italy, Germany, France, Spain, at the Dead Sea in Palestine, and in Canada, Cuba, and Mexico. The Trinidad lake fills the crater of an old volcano, and is 114 acres in area and 135 ft. deep in the center. It is so hard that loaded wagons can drive over the surface. Nevertheless, the material is in constant slow movement, and it is thought that about 20,000 to 25,000 tons of soft A flow in at the bottom every year to replace the 100,000 or 125,000 tons that are mined. At several points near this pitch lake what is known as *land* A. is found, which is supposed to have overflowed from the lake at some early period. These deposits are harder and more free from volatile oils than the *lake* A. evidently because of longer exposure to the sun and weather. The A. of Trinidad is regarded as being excellent in quality, and much of it is imported to the United States. The composition is nearly one-half pure bitumen, a little over one-quarter clay, and one-fourth water. It is shipped crude to secure

a lower duty in passing the United States Custom House, but is refined here to remove the water and harden. The Venezuela A. is found about 20 miles from the Gulf of Paria, in the State of Bermudez. The deposit is often spoken of as a pitch lake, but it is rather a collection of A. springs, being about 1,000 acres in extent, but having no great depth. The trees and other vegetation have to be cut away to get out the A. The product is much softer and moister than that of Trinidad, but is similar in other respects. The United States deposits are mainly of A. mixed with sand, limestone, etc., and often more correctly called bituminous rock. The deposits in California, Texas, Kentucky and Utah are usually mined by stripping the surface and blasting. In California in some instances the surface has been washed off with monitors or giant hydrants, after the method common in hydraulic mining. A. was known in early times, being mentioned in books in the 14th century. The mines of bituminous rock at Seyssel, in France, were operated early in the last century by blasting the rock, which was found in layers between white limestone. The extensive use of A. began with its employment for pavements. The first European pavement was laid in 1854, and the first in the United States in 1870, in Newark, N. J. By 1875 A. pavements became popular in the U. S., and it is estimated that in 1907 there were 50,000,000 square yards of A. pavement in the United States, laid at a cost of about $133,000,000. The life of such a pavement depends usually upon skill in manufacturing and proper mixing. Powdered A. is formed into sheets and blocks by heating and pressure. No great heat is required, about 300° F. being satisfactory. Mastic is a common name for that form of A. which is commercially prepared by crushing rock asphalt, mixing and melting while hot. A. *cement* is made of refined A., tempered with petroleum oil or the like. A. *concrete* is simply crushed stone or gravel mixed and bound together by mastic. In addition to its use for pavements, A. is commonly used for reservoir linings and for coating large iron pipes, vats, etc. Soft A. has been employed for many purposes similar to those to which tar has been applied. Artificial A. can be made from gas-tar.

The United States production of A. and bituminous rock has increased steadily for some years, being about 120,000 tons in 1906. The importation from Trinidad, which in 1902 was nearly 150,000 tons, has steadily reduced, and was less than 75,000 tons in 1906.

ASPHODEL, n. *ăs'fō-dĕl* [Gr. *asphōd ĕlŏs*, a plant sacred to Proserpine, daffodil]: a general name for certain hardy perennial plants, the yellow and white being common garden flowers; the day-lily, called also the king's spear; properly *Hemĕrōcăl'lis* is the day-lily, and *Asphŏd'ĕlus alba* is the common garden plant, formerly called king's spear—both of *Liliăcĕæ:* this genus of plants has by many botanists been made the type of a nat. ord. *Asphodeleæ*;

now, however, it is generally regarded as forming part of the order *Liliaceæ*. The *Asphodeleæ* are either fibrous-rooted or bulbous-rooted. Among the latter are onions, hyacinths, squills, star of Bethlehem, etc.; among the former, asparagus, A., etc. The roots of the asphodels are fleshy and thick. The species are not very numerous, and are natives mostly of the countries around the Mediterranean Sea. The Yellow A. (*A. luteus*) and the White A. (*A. albus*) have long been known and prized as garden flowers. The yellow A. has an unbranched stem 2–3 ft. high, much covered by the sheathing bases of the long narrow leaves. The leaves of the white A. are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer.

ASPHYXIA, n. *ăs-fĭk′sĭ-ă*, or ASPHYXY, n. *ăs-fĭk′sĭ* [Gr. *asphuxĭă*, the stopping of the pulse—from *a*, without; *sphuxis*, the pulse—*lit.*, pulselessness]: the temporary or permanent cessation of the motions of the heart as in drowning and suffocation, due to the want of air, or the presence of irrespirable gases. AXPHYXIATE, v. *ăs-fĭks′ĭ-āt*, to suffocate, as in drowning, or by breathing the fumes of certain burning substances. ASPHYX′IA′TING, imp. ASPHYXIATED, pp. a. *ăs-fĭks′ĭ-ā′tĕd*, suffocated as by hanging or drowning, or by an accumulation of carbonic acid in the blood.

ASPHYXIA, *ăs-fĭk′sĭ-ă*, or ASPHYXY, *ăs-fĭk′sĭ:* the condition resulting from the blood in the body no longer being brought into proper relations to the atmospheric air by respiration, so as to allow a sufficiently free exchange of carbonic acid for oxygen. See RESPIRATION. A. may result from several causes. No air, or but a scanty supply, may be admitted, as in strangulation, drowning, choking, or disease in the windpipe; the chest may be prevented from expanding either from a superincumbent weight or paralysis, as when a man breaks the upper part of his neck above the phrenic nerve, thus paralyzing the diaphragm; again, although there may be every capacity for respiration, the air itself may be in fault, and contain too little oxygen in proportion to other elements, such as carbonic acid or sulphuretted hydrogen, which when inhaled act as poisons. Aquatic animals may be asphyxiated either by depriving of oxygen the water that they inhabit, or by impregnating it with the gases above mentioned. As the condition of A. advances, in drowning or otherwise, the small vessels of the lungs become gorged with blood, which the heart no longer has power to force freely through them, the right side of the heart and pulmonary artery become filled with blood, while but little returns to the arterial or left side of the heart.

The person becomes pallid, except in such vascular parts as the lips, cheeks, and finger-tips, which become blue; and soon the blood, no longer aerated, produces the phenomenon of poisoning by carbonic acid. After some slight convulsive movements the person becomes insensible, the pulsations of the heart grow gradually feebler, and at last

cease altogether. In man this occurs in from a minute and a half to five minutes. Some persons can by habit accustom themselves to do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. Restoration of asphyxiated persons may be attempted with hopes of success at a very long period after apparent death. The object of all methods is, of course, to fill the lungs with fresh air. See RESPIRATION, ARTIFICIAL.

ASPHYX'IANTS: chemical substances enclosed in shells or other projectiles, which when set free produce a suffocating and poisonous effect. The French secretly made experiments with asphyxiating shot at Brest in 1851. The principle of these missles seems to have been to carry into an enemy's ship the means of generating deadly gases which would suffocate the crews between decks. Scientific artillerists dread and discountenance these novelties; they have learned to regard war almost as a mathematical science, or, at any rate, as an elaborate application of such science; and they see nothing but savage cruelty in the 'diabolical chemistry' of asphyxiants.

ASPIC, n. *ăs'pĭk* [F. *aspic:* Eng. *spike,* lavender-spike, corrupted from OF. *espic:* L. *spicus,* lavender]: savory jelly extracted from meat, as calves' feet, veal, ham, etc., together with onions, carrots and savory herbs, flavored with wine, liquors, etc.

ASPIC: see ASP 1.

ASPIDIUM: see FERN, MALE.

ASPIDOPHORUS, *ăs-pĭd-ŏf'ėr-ŭs* [Gr. *aspis,* a small, round shield; *phoros,* carrying]: genus of fishes of old order *Acanthopterygii* and the family with hard cheeks. (Cuvier).

ASPIDORHYNCHUS, n. *ăs'pĭ-dō-rĭng'kŭs* [Gr. *as'pida,* shield; *rhungchos,* a beak]: a genus of fossil fishes characterized by the tapering or beak-like prolongation of their upper jaws, armed with numerous sharp-pointed conical teeth.

ASPINWALL, *ăs'pĭn-waul:* town in Columbia, virtually a colony of the United States: at the Atlantic extremity of the Panama railway, and of the interoceanic canal in progress; about 8 m. to the n. of the old Spanish port of Chagres, 49 m. from Panama, and equidistant from the great trading capitals of Valparaiso and San Francisco. From its commanding position as a place of transit, A. is one of the busiest and most prosperous towns in the new world. It monopolizes the benefits of the traffic in both directions, to the almost utter exclusion of the rapidly decaying Panama. The climate of A., formerly very unhealthy, has been greatly improved by drainage. A. derives its name from Mr. Aspinwall, the originator of the Panama r.r. *Colon* is the P.O. name; A. is not recognized.

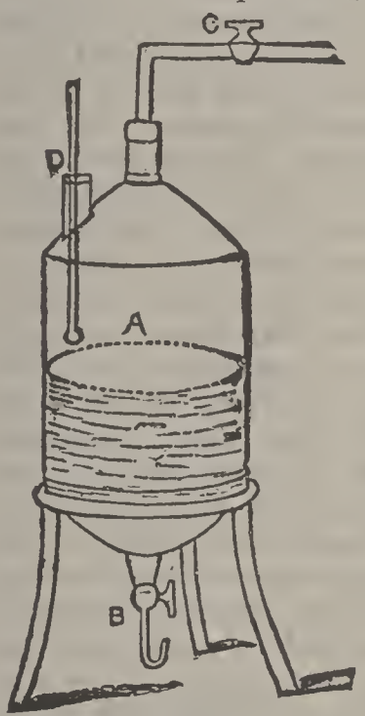
AS'PINWALL, WILLIAM, an American physician: b. Brookline, Mass., 1743, May 23; d. 1823, April 16.

He studied medicine in Philadelphia, and practised in his native town. He served as surgeon with the Revolutionary army, and later became interested in the subject of vaccination and established that preventive in American practice.

AS'PIRATE: name given to the letter *h* in grammar, as marking, not an articulate sound, but a *breathing*. It is applied also to a class of consonants. There is felt at once to be a relation, accompanied by a difference, between *p* and *f*, *t* and *th*, etc. To express the difference, the Greeks called the first of such a pair *psilon* (bare), the second *dasu* (rough); the Latin grammarians adopted the terms *lene* and *aspirate*, probably from the erroneous notion that the difference consists in the addition of the sound of *h*. There being no sound and no character in Latin corresponding to the Greek θ (*theta*), the Romans represented it by *th;* and this misleading expedient is continued for representing this aspirate and several others in all the alphabets derived from the Roman. According to some, the word ought to be *asperate*, i.e., 'roughened.' Of the sixteen mutes in a complete system (see LETTERS), eight are lene, each having its corresponding aspirate.

Lene— *p, b, t, d, k, g, s, z.*
Aspirate—*f, v, th*(in), *th*(ine), *ch, gh, sh, zh.*

In the corresponding words of allied languages, nothing is more common than the interchange of an aspirate and lene: Ex., Lat. *pater*, Eng. *father;* Gr. *thura*, Ger. *thür*, Eng. *door;* Lat. *cap*(ut), Fr. *chef*, Eng. *chief;* Ger. *weib*, Eng. *wife*. Aspirated letters are also frequently interchangeable with one another: thus, Gr. *ther*, a wild beast, is in Lat. *fera:* Lat. *facere*, to do, becomes in Span. *hacer*.



Aspirator.

ASPIRA'TOR: simple form of apparatus for drawing a liquid or fluid by means of a vacuum or suction current, on the principle familiarly observed in the atomizer. A chemist's A., for drawing off a gas, as from a retort for analysis, is shown in the figure, where A. is half filled with water. The tube C connects with the gas supply. When the stop-cock B is opened the water runs down and its weight produces suction, drawing in gas from C (if the stopcock is open), which passes with the water to a bottle or other retainer. The curve of the tube below B forms a water-seal, and serves to prevent the return of air to the interior of A. The suction induced is due to the partial vacuum caused at A by the weight of the water that runs down. D is a thermometer that may

give the temperature of the water or of the gas, according to its position. Another form of A. is used by surgeons for drawing off pus or fluid, as from tumors. It consists of an insertible glass tube, and a suction-producing syringe. A large A. is used in mining to supply fresh air to the workings. Certain grain-cooling mechanisms, operating in a similar principle, are also called A. Compare INSPIRATOR.

ASPIRE, v. *ăs-pīr′* [F. *aspirer*—from L. *aspīrārĕ*, to breathe or blow toward—from *ad*, *spīro*, I breathe—*lit.*, to breathe toward]: to desire with eagerness; to pant after; to aim at something that is difficult to obtain. ASPI′RING, imp.: ADJ. ambitious: N. the desire of something great. ASPIRED, pp. *ăs-pīrd′*. ASPI′RER, n. one who. ASPI′RINGLY, ad. *-lĭ*. ASPIRANT, n. *ăs-pī′rănt*, one who seeks with eagerness. ASPIRATE, v. *ăs′pĭ-rāt* [L. *aspīrātus*, breathed toward]: to pronounce with a full breath: N. a letter with a mark to show it must be pronounced with a full breath: ADJ. pronounced with a breathing. AS′PIRA′TING, imp. ASPIRATED, pp. *ăs′pĭ-rā′tĕd*. ASPIRATION, n. *ăs′pĭ-rā′shŭn* [F.—L.]: the act of pronouncing a letter with a full breath; an ardent wish or desire to attain. AS′PIRA′TOR, n. *-rā′tėr*, an apparatus employed by chemists for drawing air or a gas through bottles. ASPIRATORY, a. *ăs-pī′ră-tėr′ĭ*, pertaining to breathing.

ASPIROZ, *as-pē′rōth*, MANUEL DE: Mexican soldier, statesman and diplomat: b., Puebla, 1836, June 9; d. Washington, D. C., 1905, March 24. He graduated from the Univ. of Mexico in 1855, was licensed to practise law in 1863, but upon the French invasion entered the army. In the Juarez insurrection of 1863 against Maximilian, he served in the insurgent army with great distinction, rising from 2d lieutenant to colonel. After the fall of Queretaro he was appointed judge-advocate of the military court which sentenced the emperor to death, thereby incurring the lasting hatred of the imperial house of Austria, of which Maximilian was a member. In 1867 Aspiroz became assistant secretary of state for foreign affairs in the new republic; in 1872 did much to settle amicably the claims between the United States and Mexico, which dated from the Mexican war in 1845; in 1873-5 was consul at San Francisco; and in 1875 was elected senator from his native province to the Mexican national congress. In 1881 he left the senate to become a member of the commission appointed to make treaties with the powers of the world; was law professor in the College of Puebla from 1883 to 1890, when he was again appointed by President Diaz assistant secretary of state, serving in that capacity until appointed, in 1899, first Mexican ambassador to the United States, a position he held till his death. In 1900 he was the Mexican representative at the Hague tribunal; was a member of several scientific organizations, a knight commander of the military Order of Our Lord Jesus Christ of Portugal, and had been presented by the Shah of Persia with the dec-

oration of the Order of the Lion and Rising Sun, and by the dowager empress of China with the insignia of the Order of the Dragon, in both cases in appreciation of his services in negotiating treaties between their respective countries. He published: *Código de extranjeria de los Estados Unidos Mexicanos* (1876); and *La libertad civil como base del derecho internacional privado* (1896).

ASPIS, *ăs'pĭs*, or CLUPEA, *clū'pe-a:* an ancient town situated on the Mediterranean, abt. 50 m. e. of Carthage, to which it belonged. It was fortified and had an accessible harbor. In the first Tunic war, Manlius and Regulus landed at A., and in the third war it sustained a siege. It is also mentioned in connection with the Julian civil war. From A.D. 411 to 646, it was an important bishopric, and was the last place in Africa where the Christians resisted the Moslems.

ASPIS: a governor under Artaxerxes, in the neighborhood of Cappadocia. Having incited the country to revolt, he was captured by Datames, and was put to death.

ASPLENIUM, *ăs-plē'nĭ-ŭm:* genus of Ferns, of the ord. or sub-ord. *Polypodiaceæ*. The species are numerous, and widely diffused in both the northern and southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who have limited space. Some of the species bear the English name *Spleenwort*, as *A. Trichomanes*, *A. viride*, *A. Adiantum-nigrum*, etc., having been formerly supposed efficacious in removing obstructions of the viscera. From the same circumstance the name A. [Gr. *a*, privative, and *splen*, the spleen] is derived. They have now fallen completely into disuse, but were at one time very much employed, chiefly in the form of a syrup like *Capillaire* (q.v.), and were administered not only in cases of cough, asthma, diseases of the liver, and cutaneous diseases, but even in stone and gravel. But perhaps none of them were so extensively used as the species which is styled in old books Common Spleenwort (*A. Cet'erach*), now the type of a distinct genus, and known as *Cet'erach officinarum*. The genus A., in our species, has the spore-clusters (sori) long, on the inner side of the unbranched veins, oblique to the midrib of the leaf-lobe—rarely on both sides. There are nine species in e. and central United States, of which *A. Trichomanes* is one of the most common, with tufts of slender leaves.

ASPORTATION, n. *ăs'pŏr-tā'shŭn* [L. *asportātĭōnem*, a carrying or taking away—from *ab*, from; *porto*, I carry]: act of carrying or conveying away.

ASPREDO, *ăs-prē'dō* [L. *aspredo*, roughness]: genus of fishes of the sub-class *Teleostei*, order *Teleocephali*, and family *Siluridæ*. They are the only known fishes which have no mobility in the operculum. They have six or eight barbels. They are akin to the famous Electric Silurus or 'eel' of the Nile and Senegal rivers.

ASPRO, *ăs′prō* [Gr. *aspros:* L. *asper,* rough]: genus of spiny-finned fishes belonging to the Perch family. They live in the Rhone, Danube, and other rivers.

ASPROMONTE, n. *ăs-prō-mŏn′tē:* a mountain in s.w. Italy, near which, 1862, Aug. 28, a battle took place between Garibaldi's troops and those of Pallavicini. During the fight, Garibaldi was wounded and captured. He was afterward sent to Caprera. A. is near Reggio.

ASPROP'AMO: see ACHELOUS.

ASQUINT, ad. *ă-skwĭnt′* [Dut. *schuinte,* a slope, obliquity (see ASKANCE)]: toward one side; obliquely.

ASQUITH, HERBERT HENRY: English statesman: b. Morley, England, 1852, Sep. 12; son of J. Dixon A. He was educated at the City of London School, and at Balliol Coll., Oxford, of which he was scholar, and afterward fellow, receiving his degree B.A., 1874. He studied law, was called to the bar at Lincoln's Inn 1876, June, and appointed queen's counsel 1890, Feb. In 1886 A. was elected member of parliament for East Fife. He was engaged as one of the counsel for Charles S. Parnell in the trial before the 'Parnell Commission,' 1888–90; he also appeared in the celebrated 'baccarat' trial, 1891. He was appointed home sec. in Gladstone's cabinet, 1892, Aug. 16. He married, 1877, Helen, daughter of F. Melland, of Manchester, England. He was conspicuous as a debater during the Home Rule discussions, and in 1894 drew up the Welsh Church Disestablishment Bill. In December 1905 he was appointed Chancellor of the Exchequer in the Liberal cabinet of Sir Henry Campbell-Bannerman.

ASS, n. *ăs* [L. *asĭnus,* an ass: Icel. *asni:* W. *asyn:* Ger. *esel:* Pol. *osiol,* an ass]: a well-known beast of burden, dull and slow, but patient and hardy; a dull, stupid person. ASININE, a. *ăs′ĭ-nīn,* pertaining to an ass; like an ass. ASSES' BRIDGE, Proposition V. Book I. of Euclid's Geometry, being the first difficult proposition.

ASS (*Equus Asinus*): a well-known quadruped, usually referred by naturalists to the same genus as the horse (q.v.): though there are recent attempts to make it a type of a distinct genus (*Asinus*), including all the solid-hoofed quadrupeds (*Solidungula* or *Equidæ,* see HORSE) except the horse itself. The distinction is founded on the short hair of the upper part of the tail and the tuft at the end of it, the darker stripes with which the color is marked, and the absence of the hard horny warts which are found on the hinder-legs of the horse, although the fore-legs exhibit warts in a similar position. The long ears of the A. are one of the characteristics of the species, but they are longer in domestication than in a wild state. It is usually also distinguished by a black cross over the shoulders, formed by a longitudinal and a transverse streak, the general color being gray; but when the general color is darker or lighter than usual, the cross is often less apparent, or observed with difficulty. The facial line is arched.

Some uncertainty still exists as to the origin of the

domestic A.; a number of wild races having been described, some of which are perhaps, like the wild horses of America, the progeny of animals that have escaped from domestication. The probability, however, appears to be that the A. is a native of Central Asia, where it is found in a perfectly wild state, in Tartary, Mesoptamia, Persia, etc., on the banks of the Indus, and even to the s. extremity of Hindustan; but its range does not extend so far n. as that of the wild horse—which may perhaps partly account for the inferiority of the domestic A. in northern climates. The wild A. is found both in mountainous districts and in plains; vast troops roam over the great Asiatic deserts, migrating according to the season, in summer, as far n. as the Ural; in winter s. to the borders of India. It is fond of bitter and saline herbage, and of brackish water. It was first accurately described by Pallas, under the name *Koulan*, which it bears on the high steppes around the Caspian Sea. It was, however, well known to the ancients, and is called *Onager* and *Asinus sylvestris* by Pliny, who also mentions under the name of *Hemionus*, another species (*Equus Hemionus*), native of the same regions, now called the *Kiang*, or the *Dziggethai*. The latter name appears to be of Turkish origin, and to signify Mountain A., but seems to be sometimes applied to one of these species and sometimes to the other. This seems also to be the case with some of their other eastern names, as *Khur* or *Goor*, and is a source of no little confusion.—The cross on the shoulders is less observable in the Koulan than it usually is in the domesticated A. In one remarkable particular, the domesticated A. agrees with the *Equus Hemionus*, and differs from the Koulan, the infra-orbital foramen of the skull being situated much lower. But the Kiang neighs like a horse, and the other *brays*. The harshness of the voice of the A. is ascribed to two small peculiar cavities situated at the bottom of the larnyx. The wild A. has a short mane of dark woolly hair, and a stripe of dark bushy hair runs along the ridge of the back from the mane to the tail. It has longer legs, and carries its head higher than the domestic A. Its troops have always a leader. It is a high-spirited animal, very fleet and very wary, trying to the utmost the powers of the hunter. It is a principal object of the chase in Persia, where its flesh is prized as venison as in Europe, and it is accounted the noblest of game. Xenophon, in his *Anabasis*, describes the wild A. as swifter of foot than the horse, and its flesh as like that of the red deer, but more tender.

The domestic A., also in Arabia, Persia, Syria, and other eastern countries, is a much finer animal than is usually seen in Europe, except in Spain, Italy, and Malta, where it is treated better, and is more highly valued. In the east, where it was formerly chosen by the rich and the great, it is still used for riding. It was one of the earliest animals domesticated, but its introduction to n. Europe is comparatively recent. Though sometimes used for light work, the A. is kept in the U. S. principally for raising

mules (see MULE). Ky., Tenn., Ill., and Mo. are among the states in which asses are most largely bred. The first valuable stock brought to this country arrived 1787, in which year Gen. Washington, who was interested in breeding mules, received a male and two females from the king of Spain, and a Maltese male and female from Gen. Lafayette. The A. can be kept on much cheaper food than the horse, and is less liable to diseases and accidental injuries. Though commonly regarded as obstinate and stupid, it is, when well bred and kindly treated, both docile and intelligent.

There are two hybrids between the A. and the horse—the MULE (q.v.), bred between the male A. and the mare; and the HINNY (q.v.), the offspring of the horse and the female A.

The milk of the A. contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has been long known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which regulate its treatment now, and when very nutritious food was not usually prescribed to consumptive patients.

ASSAB, *âs-sâb′:* Italian trading station on the w. coast of the Red Sea, near Bab-el-Mandeb. It was first acquired by a private company of Italians, but passed into the possession of the government of Italy, 1881.

ASSAFŒTIDA: see ASAFETIDA.

ASSAGAY, or ASSAGAI, better spellings of ASSEGAI—which see.

ASSAI, ad. *ăs-sâ′i* [It. *assai:* Fr. *assez*, enough—from L. *ad*, to; *satis*, enough]: in *mus.*, very; as *largo assai*, very slow.

ASSAI, *ăs-sī′:* a beverage much used on the Amazon, prepared from palms nearly allied to the Cabbage Palm (q.v.). The most common species of A. palm is 60 ft. high, with a smooth stem about four inches in diameter. The fruit is small, in size and color resembling sloes, but is produced in great quantity upon branched *spadices*, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Boys climb the trees for the fruit, upon which warm water is poured, and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly vended in the streets of Pará, and of which the inhabitants are extremely fond. This is A. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used along with the bread made from Manioc (q.v.), called *farinha*, and either with or without sugar. Half the population of Pará make a daily meal of A. and farinha; and upon this hundreds are said chiefly to exist. The stem of the A. palm is something used for poles

and rafters, and its terminal bud as a cabbage or as a salad with oil and vinegar, but it is too much valued for its fruit to be cut often down for these purposes.—Another species, *Euterpe Catinga*, is found in forests of a dry sandy soil and very peculiar vegetation, known as Catinga forests. The beverage made from it is sweeter than the common kind, but the produce of the tree is much smaller.

ASSAIL, v. *ăs-sāl'* [F. *assaillir*, to asssail—from mid. L. *assailīrĕ*, to assail—from L. *ad*, to; *salĭō*, I leap]: to leap or fall upon by violence; to attack with a view to overcome or injure as in words or writing. ASSAIL'ING, imp. ASSAILED, pp. *ăs-sāld'*. ASSAILABLE, a. *ăs-sāl'ă-bl*, that may be attacked. ASSAILANT, n. *ăs-sāl'ănt*, or ASSAIL'ER, one who assails or attacks. ASSAIL'ANT, a. assaulting; attacking.—SYN. of 'assail': to attack; assault; encounter; invade.

ASSAL, *âs-sâl':* salt lake in the e. of Africa, 25 m. s.w. of Tajurrah, the chief seaport of Adel; lat. 11° 40′ n., long. 42° 40′ e. Its length is 8 m.; its breadth, 4 m. It lies in a land remarkable for its wild, waste, and sterile character. A. is enclosed on all sides but the e. by hills, and is nearly 600 ft. below the level of the sea. Abyssinian caravans resort to it for the purpose of carrying off the salt which incrusts its shores like ice, sometimes to the depth of half a foot. It has been supposed that it was at one time connected with the Bay of Tajurrah.

ASSAM, *ăs-săm':* province at the n.e. extremity of Brit. India; lat. 23°–28° n., long. 89°–97° e.; 49,004 sq. m.; divided into 13 dists.; principal towns, Gauháti and Sylhet; seat of govt., Shillong. It forms part of the basin of the Lower Brahmaputra, and from that and about 60 other rivers derives exceptional drainage and irrigation. The chief products are rice, tea, oil seeds, and other food grains and sugar-cane. Other products are gold, ivory, iron, lead, petroleum, coal, mustard, and musk; the tea crop is usually about three-fourths of the total production in India. Chief imports are woolens, India fabrics, salt, opium, glass, earthenware, tobacco, and betel. One of the most striking features of A. is the abundance of wild animals, such as tigers, rhinoceroses, leopards, buffaloes, and elephants. Of elephants, not less than 500 are annually caught; and, when tamed, bands of them may be seen, harmless as cows, in the charge of a single attendant. The forests teem with game, and the rivers with fish. The province has steamboat communication with Calcutta, Dibroogurh, and intermediate points; and railway traffic with Calcutta, Dhoobri, and towns between. Of the pop. by 1901 census, 3,429,459 were Hindus, 1,581,317 Mohammedans, 1,068,334 Animistic, and 35,969 Christians. Education was under encouraging development. The revenue in year ending 1891, Mar. 31, was Rx. 1,027,214; expenditure Rx. 698,480.—In 1826, at the close of the first Burmese war, A. was ceded to the British. The

upper portion of the province was, however, under a native rajah, till 1838, when, in consequence of his misgovernment, the entire country was placed under Brit. administration. The native state of Manipur, where the Brit. resident and the chief commissioner of A. were massacred, 1891, is subordinate to A.—Pop. (1881) 4,881,426; (1891) 5,476,833; (1901) 6,126,343.

ASSAMAR, n. *ăs'sa-mâr:* in *chem.*, a bitter substance contained in the brown oil obtained by the destructive distillation of cane sugar.

ASSARIUS, n. *as-săr'ĭ-ŭs* [L. *assarius:* Gr. *assarion*—both from L. *as*, a Roman coin]: in classic times, a coin worth nearly two cents. In Matt. x. 29 it is translated penny.

ASSART, n. *ăs-ârt'* [mid. L. *assar'ta:* F. *essart*, land cleared of wood by having the trees grubbed up]: in *OE.*, parts of forests cleared of wood and made arable; in *law*, the crime of cutting down forest wood.

ASSASSIN, n. *ăs-săs'ĭn* [Ar. *hashishin*, drug-eaters—viz., of bhang or extract of hemp—from *hashish*, the intoxicating preparation of hemp: F. *assassin*]: one of a famous eastern sect of professional murderers, called assassins, stimulated thereto by the use of extract of hemp; one who kills, or attempts to kill, by surprise or by secret attack. ASSASSINATE, v. *ăs-săs'sĭ-nāt*, to kill, or to attempt to kill, by surprise; to murder by a secret attack. ASSAS'SINA'TING, imp. ASSAS'SINA'TED, pp. *-nā'tĕd.* ASSASSINATION, n. *ăs-săs'sa-nā'shŭn*, the act of murdering by secret violence or by surprise. ASSAS'SINA'TOR, n. *-sĭ'nā'tėr*, a murderer by surprise.—SYN. of 'assassinate': to kill; murder; slay; slaughter.

ASSAS'SINA'TION, a term denoting the murder of any one by surprise or treachery. It is commonly applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times, assassination was often even applauded, as in the Scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogeiton; but assassination by enthusiasts and men devoted to an idea first became prominent in the religious struggles of the 16th and 17th centuries. To this class belong the plots against the life of Queen Elizabeth; while the succession of assassinations of Roman emperors is but a series of murders prompted by self-interest or revenge. Omitting these last, the following list includes the most important assassinations, arranged in chronological order. Fuller accounts of the persons mentioned will be found under their particular headings: Philip of Macedon, B.C. 366; Julius Cæsar B.C. 44, Mar. 15; Thomas Becker A.D. 1170, Dec. 29; Albert I., Emperor of Germany, 1308, May 1; James I. of Scotland, 1437, Feb. 21; Alessandro de Medici, 1537, Jan. 5; Cardinal Beaton, 1546, May 29; David Riccio, 1566, Mar. 9; Lord Darnley, 1567, Feb. 10; James, Earl of Murray, Regent, 1570, Jan. 23; William of Orange,

1584, July 10; Henry III. of France, 1589, Aug. 1-2; Henry IV. of France, 1610, May 14; Villiers, Duke of Buckingham, 1628, Aug. 23; Wallenstein, 1634, Feb. 25; Archbishop Sharp, 1679, May 3; Gustavus III. of Sweden, Mar. 16, d 1792, Mar. 29; Marat, by Charlotte Corday, 1793, July 13; Gen. Kleber at Cairo, 1800, June 14; Paul, Czar of Russia, 1891, Mar. 24; Spencer, Perceval, premier, 1812, May 11; Kotzebue, the dramatist, 1819, Mar. 23; Duc de Berri, 1820, Feb. 13; Charles III., Duke of Parma, Mar. 26; d. 1854, Mar. 27; President Abraham Lincoln, April 14; d. 1865, April 15; Michael, Prince of Servia, 1868, June 10; Marshal Prim, Dec. 28; d. 1870, Dec. 30; Georges Darboy, Archbishop of Paris, 1871, May 24; Earl of Mayo, governor-general of India, 1872, Feb. 8; Sultan Abdul-Aziz, 1876, June 4; Alexander II., Czar of Russia, 1881, Mar. 13; President James A. Garfield, Jul. 2, d. 1881, Sept. 19; Lord Frederick Cavendish and T. H. Burke, in Phœnix Row, Dublin, 1882, May 6; President Sadi Carnot, France, 1894, June 24; Ex-Premier Stefan Stambuloff, Bulgaria, July 15; d. 1895, July 18; Premier Canovas del Castillo, Spain, 1897, April 22; President Juan Idiarte, Uruguay, 1897, Aug. 25; Empress Eilzabeth of Austria, in Geneva, 1898, Sept. 10; President Ulisses Heureaux, Santo Domingo, 1899, July 26; King Humbert of Italy, 1900, July 29; President McKinley, Sept. 6; d. 1901, Sept. 14; Alexander of Servia, 1903, June 11.

Many attempts at assassination have been unsuccessful. Among those within the last century may be named: Against Alexander III. of Russia, repeatedly; Alfonso XII. of Spain, 1878 and 1879; Amadeus of Spain, 1872; Duc d'Aumale, 1841; Prince Bismarck, 1866 and 1874; Francis Joseph of Austria, 1853; George III. of England, 1786 and 1800; George IV. (when Regent), 1817; Humbert I. of Italy, 1878 and 1897; Isabella II. of Spain, 1847, 1852, and 1856; Louis Philippe, six attempts, from 1835 to 1846; Lord Lytton, viceroy of India, 1878; Napoleon I., by infernal machine, 1800; Napoleon III., twice in 1855, and Orsini's attempt in 1858; Queen Victoria, 1840, June 10, 1842, May 30, 1842, July 3, 1849, May 19, and 1882, March 2; William I. of Germany, 1861, 1875, and twice in 1878; President Diaz of Mexico and President Morales of Brazil, both in 1897; the Prince of Wales in 1900; Alfonso XIII. of Spain, 1905 and 1906.

In the modern Russian revolution, assassination has been used as a weapon by the revolutionists more persistently than ever before. Every enforcement of the policy of repression on the part of the government has been met by the assassination of police and government officials, usually those most brutal in their methods, or most noted for their support of the bureaucracy. Among the most prominent men thus assassinated were Von Phleve, Minister of the Interior (1904); Grand Duke Sergius, and Sakharov, ex-Minister of War (1905); Vice-Admiral Chukonin, Gen. Kozlov (in mistake for Gen. Trepov), and Gen. Pavlov, military procurator (1906).

ASSASSINS: a military order, branch of the secret sect of the Ismailis (q.v.). The secret doctrines of these Ismailis, who had their headquarters in Cairo, declared the descendants of *Ismael*, the last of the seven so-called imaums, to be alone entitled to the caliphate; and gave an allegorical interpretation to the precepts of Islam, which led, as their adversaries asserted, to considering all positive religions equally right, and all actions morally indifferent. The founder of these last was Hassan-ibn-Sabbah-el-Homairi, of Persian descent. The internal constitution of the order, which had some resemblance to the orders of Christian knighthood, was as follows: First, as supreme and absolute ruler, came the Sheikh-al-jebal, the prince or Old Man of the Mountains. His vicegerents in Jebal, Kuhistan, and Syria were the three Dai-al-kirbal, or grand-priors of the order. Next came the Dais and Refiks, which last were not, however, initiated, like the former, into every stage of the secret doctrines, and had no authority as teachers. To the uninitiated belonged, first of all, the Fedavis, or Fedais—i.e., the devoted; a band of resolute youths, the ever ready and blindly obedient executioners of the Old Man of the Mountain. Before he assigned to them their bloody tasks, he used to have them thrown into a state of ecstasy, by the intoxicating influence of the *hashish* (the hemp-plant), whence the order was called Hashishin, or hemp-eaters. The word was changed by Europeans into Assassins, and transplanted into the languages of the West with the signification of murderers. The Lasiks, or novices, formed the sixth division of the order, and the laborers and the mechanics the seventh. Upon these, the most rigid observance of the Koran was enjoined. The catechism of the order, placed by Hassan in the hands of his dais, consisted of seven parts, of which the second treated, among other things, of the art of worming themselves into the confidence of men. In 1256, the Mongolian prince, Hulagu, burst with his hordes upon the hill-forts of Persia, numbering about a hundred, held by the Assassins, capturing and destroying them. The Syrian branch also was put down about the end of the 13th c., but remnants of the sect lingered for some time longer in Kuhistan. In 1352, the A. reappeared in Syria, and indeed they are still reported to exist as a heretical sect both there and in Persia. The Persian Ismailis have an imaum, or superintendent, in the district of Kum, and still inhabit the neighborhood of Alamoot under the name of Hosseinis. The Syrian Ismailis live in the district of Massiat or Massyad. Their castle was taken from them in 1809 by the Nossaris, but afterward restored. See Hammer, *Geschichte der Assassinen.* (Stutt. and Tüb. 1818); Guyard, *Fragments* (1874).

ASSAULT, n. *ăs-sawlt'* [OF. *assalt:* F. *assaut*, an assault —from L. *assal'tus*, leaped upon—from L. *ad*, *saltus*, a leaping (see ASSAIL)]: an assailing or setting upon; a violent or hostile attack; in *mil.*, the attempt to capture a fortifi-

cation or a town, etc., by main force: V. to fall upon with violence; to attack in words or writing. ASSAULT'ING, imp. ASSAULTED, pp. *ăs-sawlt'ĕd.* ASSAULT'ER, n. one who. ASSAULTABLE, a. *ăs-sawlt'ă-bl,* that may be assailed or assaulted.—SYN. of 'assault, v.': to attack; assail; encounter; invade; storm; charge;—of 'assault, n.': invasion; attack; incursion; onset; descent; storming; charge; onslaught.

ASSAULT: sudden and violent attack. In A. on a fortified post, the troops are told off into 'storming-parties,' 'supports' and 'firing-parties.' The storming-parties are those who take the most terrible duty, being that of making a forcible entry into the place. The firing-parties or musketeers seek to shield the storming-parties as much as possible from the fire of the enemy; they spread themselves out in extended order, to keep down the fire of the garrison—aiming at any soldier who may show his head above the parapet, and seeking to disable the artillerymen by firing into the embrasures. Many assaults are made by *surprise;* and in that case the storming and firing parties order all their preliminary movements as quietly as possible. In most cases, there is a necessity for the stormers to descend into a dry ditch, and to ascend from the ditch to a breach or a gate in the fortified wall. To aid in this duty, 'ladder-parties' are placed at the disposal of the storming-parties; these men have previously been practiced in carrying scaling-ladders, descending and ascending ditches, and adjusting the ladders.

ASSAULT': in law, an assault is a movement virtually implying a threat to strike, as when a person raises his hand or his cane in a menacing manner, or strikes at another but misses him. It is not needful to touch one to constitute an assault. When a blow actually takes effect, the crime is not simple assault, but assault and battery. Assault, however, is usually coupled with battery, and for the reason that they generally go together; but the assault is rather the initiation or offer to commit the act of which the battery is the consummation. An assault is included in every battery. An aggravated assault is one performed with the intention of committing some additional crime, such as an assault with intent to commit rape, assault with intent to murder, an assault with a deadly weapon, an indecent assault. The defenses usually interposed in cases of assault, are self-defense, recapture of property, ejectment of trespassers, defense of property, defense of family, accident, etc. A person assaulting another may be prosecuted by him for the civil injury, and also be punished by the criminal law for the injury done to the public.

ASSAY, v. *ăs-sā'* [F. *essayer,* to try: *essai,* a trial—from mid. L. *exāgĭum:* Gr. *exāgĭon,* a weighing, a trial]: to prove by examination: to try or prove, as metals; to attempt; to endeavor: N. examination; trial, as of the purity of silver or gold; tested value. ASSAY'ING, imp. ASSAYED, pp. *ăs-sād'.* ASSAY'ER, n. one who.

ASSAY.

ASSAY, or ASSAYING: process employed in determining the proportion of pure metal in a metallic or in an alloy. The two general methods of A. are called 'wet' and 'dry.' The details vary greatly according to the metal that is to be separated. The *dry process* of estimating gold and silver is as follows: If the material proposed for A. is bullion or a metallic alloy, holes are bored into the specimen and the borings mixed. In the case of an ore the sample is obtained by 'quartering.' From a heap of ore every tenth shovelful is thrown upon the floor till a large heap has accumulated. This heap is divided into quarters. Two of the diagonally opposite quarters on the floor are thrown back into the main body of ore, and the remaining quarters are thoroughly mixed, spread out and quartered again, this process being repeated many times until the original sample is reduced to from one to three pounds. This remainder is finely ground and a small quantity selected for test. In practice the operation just described is commonly done in a sampling mill by special machinery, but the principles involved are the same. It is common to take three samples obtained by quartering and have them analyzed separately, and if the results agree nearly the average is taken as a fair value of the contents. If not, the work is done over again.

The specimens of ore received by the assayer are ground fine enough to pass through a screen having 60 to 100 meshes to the inch, the metallics (or particles of metal that will not pass through the screen) being collected and reserved for separate A. If the ore is new to the assayer he examines it microscopically, otherwise he proceeds at once to the process of 'scorification,' the object of which is to separate the gold and silver so that they are secured in the form of a little lump technically termed a 'button.' Scorification depends for its success upon the fact that when an ore of gold and silver is highly heated with metallic lead, in the presence of air, the baser metals that are present will oxidize, and the lead oxid that is formed will dissolve the quartz while the gold and silver will not oxidize, but be left in a metallic state, alloyed with a proportion of lead which remains unoxidized. In common practice, about 50 grains of the ore are mixed with 500 grains of granulated lead and placed in a sort of crucible called a 'scorifier.' Another charge of 500 grains of lead is spread over the mass and a few grains of borax sprinkled on. The crucible with its contents is then heated for about 45 minutes in a muffle, to which a small amount of ore is admitted, after which the melted mass is poured into a mould to cool. It will then be found to contain a button of metallic lead, which button contains all the gold and silver that was in the ore, and also a considerable amount of refuse or slag, consisting of oxid of lead, silicates, and the like. This slag is readily broken from the button by rapping with a hammer.

Cupelling is the next step. This process is based upon the fact that when an alloy of gold, silver, lead and base

metals is heated in a current of air, the lead and other base metal will oxidize, and the melted lead oxid, called 'litharge,' will retain the other oxids. The cupel is of porous material so that the melted lead oxid will soak into it, thus carrying all the base oxids away and leaving behind a button composed of pure gold and silver. After the pure button has been produced in the cupel it displays iridescent colors that inform the practiced eye that the scorification process is complete and the metals pure. If the original ore contains no silver the A. is now completed, and it only remains to weigh the gold and compare its proportional weight with that of the sample of ore assayed. But if silver is present, the process of 'parting' follows, to separate it from the gold. Parting depends upon the fact that nitric acid will dissolve the silver from an alloy of silver and gold, provided the weight of silver is at least two and a half times that of the gold. To insure this proportion of silver a known quantity of pure silver is added, and the alloy so formed is flattened into a thin ribbon, which is rolled into a spiral called a 'cornet,' and boiled in nitric acid. The cornet is next washed in distilled water and again boiled in nitric acid to remove the last traces of silver, after which it is thrown into a crucible and melted into a button of pure gold.

The metallurgic chemist, while performing an A., can determine, by the examination of the stains on the cupel after the process has been finished, what metal may have accompanied, and been separated from, the silver, even in minute quantities. Thus, lead alone imparts a straw-yellow or orange stain; copper a gray or dark-brown tint; and iron, a black stain.

During the A. of silver by the foregoing or dry method, a certain loss of metal usually occurs, which averages 2 parts in 1,000; and this has induced the authorities in the mints of Great Britain, France and other European kingdoms, and of the United States, to adopt a *humid* process for the A. of silver, which will determine the value of a silver alloy to within 0.5 (or half a part) in 1,000. The *humid* or *wet process* consists in dissolving the compound of silver in nitric acid of density 1.25, and thereafter adding a solution of common salt (chloride of sodium, NaCl), which causes the precipitation of the chloride of silver (AgCl) in white flocculi. The common salt is made of a definite strength, and is poured out of a measured or graduated vessel, till all further precipitation of the silver ceases, when the amount required of the solution of common salt is read off, and by a simple calculation its equivalent in pure silver is obtained.

To A. lead, the fire-assay is commonly used. One part of ore and 3 to 5 parts flux are heated red hot in a clay crucible, moulded, and the resultant button hammered, cleaned of slag, and weighed. Zinc is frequently determined by volumetric methods, and copper by electrolytic process.

Assay Offices are maintained by the United States

Government in several prominent cities Any one wishing to have gold and silver assayed in quantity, or wishing to sell metal to the Government for use in coining, may present his property, at the assay office where it is reduced to metal and made into bars, which are returnable to him upon payment of a fee, though more usually the metal is retained and the Government pays him its value, less a small charge for doing the work. When the metal is received, whether coin, jewelry, tableware or the like, it is weighed by mechanisms of great accuracy and a receipt given. Each person's holdings are placed in a box and taken to the melting-room, where they go into crucibles with a flux and are melted and cast into ingot moulds. After casting, a small chip is taken for assay to determine its purity and value. If the depositor wishes to part with his bullion the Government pays for it, and proceeds to separate or part the gold and silver. The price paid for gold never varies, being $20.67 a fine ounce. Silver fluctuates with the market. The A. office in New York City was established in 1854, and transacts a large business. It stands next to the Sub-Treasury building, at the intersection of Wall and Broad streets. See ALLOY, MINT, HALL-MARK, GOLDSMITHS' COMPANY, PLATE-MARKS.

ASSAYE, *âs-sī'*: t. in the n.e. of the nizam's dominions, at the fork of the Juah and Kaitna; noticeable as the scene of the first great victory of the Duke of Wellington, then Maj.gen. Wellesley, 1803, Sep. 23. The British troops in action were only abt. 4,500 while the Mahrattas under Scindia and the rajah of Berar numbered 50,000, of whom 10,000 were commanded by French officers. Cannon numbering 98, 7 standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose military supremacy was soon acknowledged over a great portion of India. In 1851, a medal was struck in commemoration of the victory.

ASSEERGHUR, *a'sēr-gŭr'*: fort on an isolated mountain at the n.e. angle of the presidency of Bombay, lat. 21° 26′ n., long. 76° 26′ e.; elevation above the base of the mountain, estimated 750 ft. Its extreme length and breadth are respectively 1,100 and 600 yds.; from the irregularity, however, of the outline, the area is computed at not more than 300,000 sq. yds., or somewhat less than $\frac{1}{10}$th of a sq. m. With the exception of two avenues of ascent, both of them difficult and strongly fortified, the space is everywhere terminated by a carefully scarped precipice, varying in height from 80 to 100 ft. This formidable fastness has been twice taken by the British—in 1803 and 1819.

ASSEGAI, n. *ăs'sĕ-gā*, or ASSAGAY, or ASSAGAI, n. *ăs'ă-gā* [Sp. *azagaya*, a spear or half-pike]: a dart or javelin used by the South African tribes: V. to pierce or kill with an assegai. AS'SEGAYING, imp. ASSEGAIED, pp. *ăs'ĕ-gād*.

ASSEMBLE, v. *ăs-sĕm'bl* [F. *assembler*, to gather, to assemble—from mid. L. *assĭmŭlārĕ*, to bring together into

one place—from L. *ad, simul,* together: AS. *samod,* together]: to bring persons or things together; to meet together. ASSEM′BLING, imp. ASSEMBLING, n.: process of bringing together the parts of something, as a mechanism. The A. of a large and complicated machine involves not only bolting, riveting or otherwise attaching the parts, but the accurate fitting of each, and adjusting to position. Although nearly all machinery is now made with interchangeable parts, each of assumed accurate dimensions, yet the adjusting to absolute working position and correct motion usually requires much time and labor. A rifle might be assembled in an hour or two, while a mammoth newspaper printing press might occupy several men for months. In a large manufactory the A. is a separate department, called assembling department or erecting department, where all machines are set up and tested before being packed for shipment. ASSEMBLED, pp. *ăs-sĕm′bld.* ASSEM′BLER, n. *-blėr,* one who. ASSEM′BLAGE, n. *ăs-sĕm′blāj,* a mass of persons, a collection of particulars. ASSEMBLY, n. *ăs-sĕm′blĭ,* a number of persons met for a common object; a congregation; a convocation. GEN′ERAL ASSEM′BLY, the highest ecclesiastical court in the Established and Free churches of Scotland, and in the Presb. churches in Ireland and in the United States.—SYN. of 'assemble': to muster; collect; convene; convoke;—of 'assembly': assemblage; group; collection; company; meeting; congregation; parliament; diet; congress; convention; synod; convocation; council.

ASSEM′BLY, GENERAL: in Scotland, Ireland, and the United States, denotes the highest court of the Presb. Church. It differs from the Anglican Convocation in its constitution and in its powers, representing as it does both the lay and the clerical elements in the church, and possessing supreme legislative and judicial authority in all matters purely ecclesiastical. The General A. of the Established Church of Scotland consists of representatives, clerical and lay, from all the presbyteries of the church, from the royal burghs of Scotland and from each of the Scotch universities. The Assembly meets once a year, in the middle of May, at Edinburgh, and sits for 10–12 days. Its deliberations are presided over by a moderator, whose election is the first step in the proceedings, after a sermon by his predecessor. Its relation to the state is represented by a royal commissioner, who exercises no function in the A. beyond that of adding by his presence the sanction of the civil authority to its proceedings. The other functionaries are a principal and a deputy clerk, both clergymen, a procurator, and an agent. All business not despatched during the session of the A. is referred to a commission, with the moderator as convener, which meets immediately after the dissolution of the A., and again quarterly. The General Assembly of the Free Church of Scotland, which has 16 synods comprising 73 presbyteries, and the General Assembly of the Irish Presb. Church, are similarly constituted, the principal

difference being the absence of the royal commissioner. In the United States, the General Assemblies of the Presb. Church, of the Presb. Church South (a secession from the former), of the Cumberland Presb. Church, and of the United Presb. Church, are constituted on the same general model with some differences in detail. The General Assembly of the Presb. Church in the United States has now become a very large body, as it is formed of delegates from the presbyteries in the proportion of one delegate to every 24 members of those bodies. See PRESBYTERY: SYNOD: BARRIER ACT, etc.

ASSEM'BLY, NATIONAL (France): title assumed by the commons of the states-general (q.v.), convoked by Louis XVI. of France, and opened 1789, May 5. The states-general consisted of two privileged orders, clergy and nobles, and of the *tiers-état* or commons. The privileged orders refused to join the third estate and deliberate in a common chamber, and the latter, of its own authority, June 17, assumed the title of *Assemblée Nationale*, and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23; but the deputies of the third estate, along with the liberal members of the other two orders, had bound themselves by oath not to separate until they had given France a constitution, and had declared every attempt at violence on the part of the court, treason. They refused to quit the common hall, and the court yielded, and commanded the nobles and clergy to join the National A. This was the beginning of the revolution, and the A. proceeded with astounding rapidity to metamorphose old France. The abolition of all privileges, Aug. 4, was followed by abolition of hereditary jurisdiction, and of restraints on religion and the press, and by the declaration of the Rights of Man (q.v.). In 1790, Feb., the monastic orders were suppressed, and all remnants of feudalism swept away; in March, *lettres de cachet* and the oppressive salt-tax were abolished; in June, all orders and titles of nobility. In July, non-Catholics had the property confiscated from their ancestors restored; Jews were relieved from personal taxation; and game-laws done away. A decree of Oct. 18 abolished the cruel criminal penalties of Louis XIV. In 1791, Jan., all corporations and guilds were abolished, and free-trade introduced. In Feb., political rights were conceded to Quakers; in May, the customs at city gates were abolished; in June, the torture; the violation of the secrecy of letters was also declared criminal. In Sep., all citizens, of whatever color or religion, received political rights.

The principles on which the Assembly proceeded were the sovereignty of the people, the independence of the communes, the limitation of the royal power through a conditional veto (q.v.), the separation of the political authorities, and the responsibility of ministers. Accordingly, the A., shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees, 1789, Sep., determined that the legislative body should form only one chamber, and should be renewed

every two years; other decrees declared the king inviolable, and the throne inalienable. A decree of Nov. 7 forbade the deputies to undertake the place of ministers; in Dec., the new organization of the communes was begun. In 1790, Jan., France was divided into departments; in April, trial by jury was introduced; in May, it was declared that the right of war and peace belonged to the nation alone, that is, to the A.

In regard to finance, which had been the immediate cause of the Assembly's being convoked, the reforms were equally thorough. It was decreed at the outset that taxes were to be apportioned and raised without regard to rank or person. Then followed the approval of a loan of 80 millions of francs. A decree of 1789, Nov., ordered the publication of the public accounts; another in Dec. established a national bank. In 1790, March, appeared the first law sanctioning the sale of 400 million francs' worth of the national domains; and in April, another ordering the issue of *assignats* (q.v.) on the national property; in Oct., these assignats were declared to bear no interest. These measures were followed, in the beginning of 1791, by a series of laws regarding coining, taxation, encouragement to industry, revenue management, etc. A committee of the A. appointed to reform church matters, made a complete overturn of the old ecclesiastical system. After a declaration that Roman Catholicism had ceased to be the state religion, tithes were abolished, and church property confiscated. Church ornaments and valuables were appropriated as patriotic gifts to the state; the civil jurisdiction of the bishops was taken away, and monks and nuns were freed from their vows. The clergy was put under a civil constitution. Each department was a see, and the communes ruled and paid bishop and curés. All the clergy were amenable to the civil courts, without appeal to the pope or the interference of any ecclesiastical authority whatever. Every clergyman had to take an oath accepting this constitution, which led to the emigration of a number, and subsequently to enactments of excessive rigor against refractory priests (*prêtres insermentés*).

The A. having thus laid the revolution on a foundation of 3,250 decrees, and having sworn to the new constitution, and secured its acceptance by the king, closed its sittings, 1791, Sep. 30. From its having framed the constitution (which lasted only 12 months), this assembly is usually called the Constituent A. It made way for the LEGISLATIVE ASSEMBLY, which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree had provided that no member of the Constituent should be returned to the Legislative A. But the democratic party received such preponderance at the elections, that the A. forgot its mission from the very first, and commenced a war with the remnants of the royal authority, which ended, 1792, Aug. 10, with the overthrow of the throne and the suspension of the king. The constitution had provided for an appeal to the nation in extreme cases, and the Legislative A. now exercised that right by con-

voking a *National Convention* (q.v.), which, being invested with the powers of the sovereign, was to decide on the fate of the monarchy, and remodel the whole political system.

The title of National A. has been assumed by various other parliamentary bodies, originating in popular commotions, and aiming at radical political changes; as the French A. that met after the revolution of 1848, Feb., which was followed 1849, Apr., by a Legislative A.; the German National A. at Frankfort; and the Prussian National A. Under the existing French republic, the senate and the chamber of deputies united form the National A.

ASSEM'BLY OF DIVINES', or WEST'MINSTER ASSEM'BLY: a convocation appointed by the Long Parliament for settling the doctrine, liturgy, and government of the Church of England. It consisted of 120 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the Church of Scotland. Twenty-five of those whose names were contained in the ordinance calling the Assembly, dated 1643, June 12, never appeared at the discussions, one or two of them having died about the time of the first meeting, and the others fearing the displeasure of the king. To supply the place of these absentees, some additional members, called the superadded divines, were summoned to attend. The A. held its first meeting 1643, July 1, and continued to sit till 1649, Feb. 22, during which time it had met 1,163 times. Its most important work was concluded long before that time. The Presbyterians formed a large majority in the Assembly, and exercised a corresponding influence on its decisions. In doctrine, the members were almost unanimous; but on the subject of church government, opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal fruits of its deliberations were the *Directory of Public Worship*, the *Confession of Faith*, the *Shorter Catechism*, and the *Larger Catechism*. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian church government, constitute to this day the authorized standards of the Presbyterian churches of Scotland, Ireland, England, and the United States. At the time of the Restoration the whole proceedings were annulled as invalid.

ASSENT, v. *ăs-sĕnt'* [OF. *assentir*, to assent, to consent—from L. *assentĭō*, I assent—from *ad*, to; *sentĭō*, I think]: to think in accordance with some one; to admit as true; to yield; to agree: N. act of admitting or agreeing to; consent. ASSENT'ING, imp. ASSENT'ED, pp. ASSENT'ER, one who. ASSENTATION, n. *ăs-sĕn-tā'shŭn*, hypocritical assent to everything another says; pretended concurrence in every opinion, however absurd, which he broaches. ASSENTIENT, a. *ăs-sĕn'shĭ-ĕnt*, assenting to, as opposed to *dissentient*. ASSENT'IVE, a. *-ĭv*, assenting. ASSENT'INGLY, ad. *-lĭ*.—SYN. of 'assent, v.': to accede; yield; acquiesce;

consent; accord; agree; concur; coincide; comply; conform; submit; concede; approve.

ASSENT, in Law: an undertaking to do something in compliance with a request. Approval of something done. Express assent is that which is openly declared. Implied assent is that which is presumed by law. Assent must be to the same thing in the same sense. It must embrace the whole of the proposition, must be exactly equal to its extent and provisions, and must not qualify them by any new matter. Unless express dissent is shown, acceptance of what it is for a person's benefit to take, is presumed. *The Royal Assent* is the approbation given by the sovereign in Parliament to a bill which has passed both houses, after which it becomes a law. It may be given in person, when the sovereign comes to the House of Peers and the assent (in Norman French) is declared by the clerk of Parliament; or may be declared by letters-patent under the great seal, signed by the sovereign.

ASSER, n. *ăs'sĕr* [L. *asser*, a small beam or lath]: in *arch.*, a thin rafter, board, or lath.

ASSER, *ăs'ėr*, JOHN: d. 910: biographer of Alfred the Great. The *Saxon Chronicle* records some events of his career. He was a monk of St. Davids, from the Latin name of which, *Menevia*, he is termed in the old records *Asserius Menevensis*. About 885, his reputation for learning and piety procured him an invitation to the court of Alfred, where he resided at intervals during the rest of the king's life, assisting him in his studies, and receiving his affectionate confidence, of which he seems to have been every way worthy. The king promoted him to various dignities, and finally made him Bishop of Sherborne. Several works have, with more or less authority, been attributed to A. The only one undoubtedly his is *Annales Rerum Gestarum Aelfredi Magni*. This simple and most interesting narrative was first pub. 1574 by Abp. Parker. Its trustworthiness was questioned (1842) by Thomas Wright, in the article 'Asser' of his *Biographia Britannica Litteraria*. Lingard and Dr. Pauli have replied; and the prevailing impression of scholars in Anglo-Saxon literature is that there is no reason for doubting its general accuracy. The best ed. is that of Wise (Oxf. 8vo. 1722).

ASSERT, v. *ăs-sėrt'* [OF. *asserteur*, to assert: L. *assertus*, bound or fastened to one's-self—*lit.*, to join or fasten to]: to affirm positively; to maintain. ASSERT'ING, imp. ASSERT'ED, pp. ASSERTION, n. *ăs-sėr'shŭn* [F. *assertion*—from L. *assertĭōnem*]: the act of asserting; an affirmation. ASSERTIVE, a. *ăs-sėr'tĭv*, that affirms positively. ASSERT'IVELY, ad. *-lĭ*. ASSERT'ORY, a. involving an assertion; designed to support an assertion. ASSERT'OR, n. one who. —SYN. of 'assert': to affirm; asseverate; aver; protest; maintain; pronounce; declare; vindicate.

ASSES, FEAST OF: see FOOLS, FEAST OF.

ASSESS, v. *ăs-sĕs'* [OF. *assesser*, to assess—from L.

assessus, sat down—from *ad*, to; *sessus*, sat or remained, set]: to set or fix a rate to be paid; to value; to rate. Asses'sing, imp. Assessed, pp. *ăs-sĕst'*. Asses'sable, a. *-să-bl*, that may or should be assessed. Asses'sably, ad. *-blĭ*. Assess'ment, n. the amount of a tax laid on a property. See Tax—Taxation. Asses'sor, n. *-sėr* [F. *assesseur*, an assessor—from L. *assessōrem*]: one who sits by a judge or an arbiter as a legal adviser or as a helper: in *OE.*, one next in dignity; one authorized to fix the value of property for taxation. Assessorial, a. *ăs'sĕs-sō'rĭ-ăl*, or Assessionary, a. *ăs-sĕsh'ŏn-ėr'ĭ*, pertaining to an assessor.

ASSESSMENT is the determining of the value of a man's property or occupation for the purpose of levying a tax. Determining the share of a tax to be paid by each individual. Laying a tax. Adjusting the shares of a contribution by several toward a common beneficial object according to the benefit received. Assessment of damages includes fixing the amount of damages to which the prevailing party in a suit is entitled. It may be done by the court through its proper officer, the clerk or prothonotary, where the assessment is a mere matter of calculation, but must be done by a jury in other cases. Insurance assessment is an apportionment made in general average upon the various articles and interests at risk, according to their value at the time and place of being in safety for contribution for damage and sacrifices purposely made, and expenses incurred for escape from impending common peril.

ASSETS, n. plu. *ăs'sĕts*, or Asset, n. sing. *ăs'sĕt* [OE. *asseth:* Scot. *assyth*, compensation, satisfaction: L. *ad*, for *satis*, enough: F. *assez*, enough: Ger. *satt*, satisfied—*lit.*, up to what is enough]: funds or property available for payment of debts, etc. In strictness the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or to a trading association. A. are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor; and the latter including all real estate, whether devised or descending to the heir at law. Where there are several creditors of equal degree, the executor is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole A. which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he was fully administered, or technically by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other A. that

shall come to the defendants, which is called a judgment of A. *in futuro.*

ASSEVERATE, v. *ăs-sĕv'ĕr-āt* [L. *asseverātus*, stated earnestly—from *ad*, *sĕvērus*, earnest, serious]: to assert with much earnestness; to declare positively; to affirm solemnly. ASSEV'ERA'TING, imp. ASSEV'ERA'TED, pp. ASSEVERATION, n. *ăs-sĕv'ĕr-ā'shŭn*, a positive declaration; a solemn affirmation or assertion.—SYN. of 'asseverate': to affirm; protest; declare; aver; assert.

ASSIDE'ANS: see CHASIDIM.

ASSIDENT, a. *ăs'sĭ-dĕnt* [L. *assiden'tem*, sitting by or near—from *ad*, to; *sedĕō*, I sit]: associating with or sitting by others—applied to symptoms or signs of a disease.

ASSIDUOUS, a. *ăs-sĭd'ū-ŭs* [L. *assid'ŭŭs*, sitting closely—from *ad*, *sedĕō*, I sit: F. *assidu*, assiduous—*lit.*, sitting close or near]: very attentive; careful; diligent. ASSID'UOUSLY, ad. *-lĭ*. ASSID'UOUSNESS, n. the quality of being assiduous; close diligence. ASSIDUITY, n. *ăs'sĭ-dū'ĭ-tĭ*, close application; great diligence.—SYN. of 'assiduous': diligent; active; industrious; laborious; sedulous; attentive; unwearied; indefatigable; persevering; unintermitted.

ASSIENTO, or ASIENTO, n. *ăs'ĭ-ĕn'tō* [Sp. *asiénto*, a treaty, a contract]: a contract or convention; a special treaty: specially applied to a compact between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I. of Spain who first concluded an A. with the Flemings. Next, a similar compact was entered into with the Genoese (1580), the Portuguese (1696), and on the accession of Philip V. to the Spanish throne in 1702, with the French Guinea company, which from that time took the name of A. company, upon the understanding that for ten years it should have the exclusive right of annually importing 4,800 negroes of both sexes to the continent and islands of Spanish America. The A. was next transferred to England at the peace of Utrecht in 1713, and made over by government to the South Sea company for 30 years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstandings that grew out of this last clause contributed not a little to the war that broke out between the two nations in 1739. At the peace of Aix-la-Chapelle in 1748, the English company having still four years to run, their rights were guaranteed to them; but they relinquished them at the Madrid Convention of 1750, upon the payment of £100,000, and the concession of certain commercial advantages.

ASSIGN, v. *ăs-sīn'* [F. *assigner*, to assign—from L. *as'signārĕ*, to mark out something, to seal—from L. *ad*, to; *signo*, I mark out]: to mark out something for bestowal; to point out; to allot to; to transfer: N. a person to whom property is transferred. ASSIGN'ING, imp. ASSIGNED, pp.

ăs-sīnd': Adj. that is fixed or allotted. Assigner, n. *ăs-sīn'ĕr*, one who. Assignor, n. *ăs-sĭ-nawr'*, in *law*, one who assigns. Assignable, a. *ăs-sīn'ă-bl*, that may be transferred; that can be allotted or specified. Assignation, n. *ăs'sĭg-nā'shŭn* [F.—L.]: a making over to; an appointment to meet, as of lovers; a designation or marking out. Assignee, n. *ăs'sĭ-nē'*, a person appointed to do something; one to whom an assignment is made. Assignment, n. *ăs-sīn'mĕnt*, the thing assigned; the transference of some right or interest.

ASSIGN, To, in Law: to transfer or grant over to a third party a security, a right of credit, or other right, whether in possession or in reversion, granted by a party indebted or under obligation to the party assigning. The words of assignment are to *A.*, *transfer*, and *set over*, and they operate to transfer both real and personal property. See Assignment: Assignation: Assignment of Error: Bankruptcy.

ASSIGNA'TION: a legal term in Scotch conveyancing. analogous to the English word Assignment (q.v.); though assignment is in Scotland the technical term for the transference of certain property, such as copyrights, patents, and registered vessels.

ASSIGNATS, n. plu. *ăs'ĭn-yâs'* [F.—(see Assign)]: paper money issued by the French government during the first revolution. After appropriating to national purposes the land belonging to the church, the French national assembly (see Assembly, National), instead of bringing it into the market at a time of insecurity, when its value was depreciated, issued bonds on the security of it, which were called *assignats*, as representing land *assigned* to the holder. This paper money consisted chiefly of notes for 100 francs (abt. $20) each, though many of them were for sums as low as ten or five francs, and even lower; and the first issue amounted to 400 million francs (abt. $80,000,000). The first A., issued in the spring of 1790, bore interest; subsequent issues did not. The facility of this plan of providing government income led to its being repeatedly resorted to as the property of wealthy emigrants—persons who abandoned their country in alarm—fell into the hands of the rulers, and was confiscated, till the amount rose to the enormous sum of 45,578 million francs, besides a great number of forged A. manufactured abroad and smuggled into the kingdom. The value of the A. naturally soon began to decline, and confidence once gone, the declension became fearful. In 1793, June, one franc in silver was worth three francs in paper; in Aug., it was worth six. The state took extreme measures to compel the acceptance of A. at their full nominal value. The effects of these were to cause the A. to flow back into the public treasury, to raise the prices of all commodities, and to make every one averse to have any dealings with the state. One of these consequences was attempted to be met by fixing a maximum of prices. But no one could compel producers and dealers to produce and sell at a loss; so that all business be-

came disorganized. At last the value of A. came almost to nothing. Millions of individuals had suffered incalculable loss, and only a few who had bought public lands with the A. that cost them little or nothing, had enriched themselves at the expense of the community. In 1796, March, a louis d'or (24 francs) brought 7,200 francs in A. After this, they were withdrawn from the currency (1796) and redeemed at a thirtieth of their nominal value by *man-*

Fac-simile of Assignat.

dats, a new kind of paper money, which enabled the holder at once to take possession of public lands at the estimated value, while A. could only be offered at a sale. The mandats also soon fell to a seventieth of their nominal value, and were returned to government in payment of taxes or of land.

At length, in 1796, July, the system of paper-credit, so obstinately persisted in by government, and so disastrous in its results to the public, came to an end. A law was passed, declaring that every one was entitled to transact business in whatever circulating medium he pleased; that the mandats should be taken at their current value; and that the taxes be received either in coin or in mandats at that rate. The A. were executed on a coarse kind of paper, and, as will be seen by the accompanying fac-simile, the devices were so meagre as to be easily counterfeited.

ASSIGNEE' IN BANK'RUPTCY: see BANKRUPTCY.

ASSIGN'MENT, in Law: a conveyance (usually in writing) by which one transfers to another, for a sufficient consideration, a right in expectancy, in reversion, or in possession. The common or popular meaning of this word is the

transfer of any property, real, personal, and mixed, whether the same be in possession, or in action; the technical form being to assign, transfer, and set over; but the words grant, bargain, and sell, or any other words which will show the intent of the parties to make a complete transfer, will amount to an A. The deed by which an A. is made is also called an A. By an A. of a right all the accessories which belong to it pass with it; as, if the assignor of a bond had collateral security, or a lien on property, the collateral security and the lien will pass with the assignment of the bond. The assignment of anything carries with it all that belongs to it by right of accession; if, therefore, the thing produce interest or rent, the interest or the arrearages of the rent since the A. will belong to the assignee. There are exceptions to assignments; such as personal trusts, the duties of a guardian, the salary of a judge, the commission or pay of a public officer, the right of action for fraud, and rights *pendente lite*. The indorsement of negotiable bills effects their A. Ordinarily assignments are the resort of insolvent debtors for the protection of their creditors, and to obtain their discharge from further obligation, and such cases are regulated in the different states by special statutes. In the case of an A. of a policy of insurance, by consent of the underwriter, or by statute, the A. vests in the assignee all the rights of the assignor, exception being made where a condition to the contrary is expressed in the policy. By an A. of dower the share of a widow in her deceased husband's real-estate is set apart for her use by the heir of his guardian, or by whomsoever is in possession of the land subject to dower; or, if voluntary A. be refused, this may be enforced by direction of the court after legal proceedings.

ASSIGNMENT OF ERROR: see APPEAL: ERROR.

ASSIMILATE, v. *ăs-sĭm′ĭ-lāt* [L. *assĭmĭlātus*, assimilated—from L. *ad*, to; *sĭmĭlis*, like: F. *assimiler*, to assimilate]: to make like; to bring to a likeness; to change into its own substance. ASSIM′ILA′TING, imp. ASSIM′ILA′TED, pp. ASSIM′ILABLE, a. *-lă-bl*, that may be assimilated. ASSIMILATIVE, a. *ăs-sĭm′ĭ-lā′tĭv*, or ASSIM′ILATOR′Y, -a. *tėr′ĭ*, that can make into a like or similar substance. ASSIMILATION, n. *ăs-sĭm′ĭ-lā-shŭn* [F.—L.]: the process by which plants and animals convert food into the various tissues of their own proper substance. See NUTRITION. ASSIMILABIL′ITY, capability of being assimilated. ASSIM′ILATENESS, quality of being similar to; likeness.

ASSINIBOIA, *ăs-sĭn-ĭ-boy′â:* a former Canadian dist., part of the Northwest Territories, originally formed by an order in council in 1882, but on 1905, Sept. 1, united with the province of Saskatchewan and the eastern portion of Athabasca to form the new province of Saskatchewan (q.v.).

ASSINIBOINE, *ăs-sĭn′ĭ-boyn:* river of British N. America, rising in lat. 51° 40′ n., and about long. 105° e. At Winnipeg it joins the Red river (q.v.), which discharges

its waters into Lake Winnipeg. At a point 140 m. from its mouth, the A. is 230 ft. broad, its course measures about 400 miles. The river gives name to a tribe of Indians.

ASSISI, *â-sē′sē* (*Assisium*): town of Central Italy; upon a steep hill, 13 m. s.e. of Perugia. It stands in a singularly picturesque situation, and is surrounded by a wall flanked with towers, and overhung by a lofty citadel in ruins. It is the birthplace of St. Francis (q. v.), who here founded the Convento Sacro, the first monastery of the Mendicant order that bears his name, a large and beautiful structure, and one of the earliest specimens of the Gothic style of architecture in Italy. The church and the galleries of the monastery contain fine paintings by Cimabue, Giotto, and other old masters. Besides the Convento Sacro, there are eleven other monasteries in A. Of these, the largest is the Portiuncula, which has a richly decorated church, with a cupola by Vignola. In the last century, this place was a great resort of pilgrims, visiting the tomb of the saint, of whom one hundred thousand are said to have been assembled here on one day. A. occupies the site of the ancient Assisium, a municipal town of Umbria, and presents the remains of the forum, the baths, and the aqueducts of the days of the Romans. In the piazza, or square, there stands a beautiful portico of the ancient temple of Minerva, consisting of fluted Corinthian columns and a pediment. There is abundance of olive-trees, and some fine mineral springs in the vicinity. The town has given title to a bishop since 240. It has manufactures of needles and files. Pop. 17,378.

ASSIST, v. *ăs-sĭst′* [F. *assister*, to assist—from L. *assĭstĕrĕ*, to stand by one—from *ad*, to; *sisto*, I am made to stand]: to stand by one as counsel before a tribunal; to help; to relieve; to aid; to succor. ASSIST′ING, imp. ASSISTED, pp ASSISTANCE, n. *ăs-sĭs′tăns* [F.]: help; succor; aid. ASSIS′TANT, a. helping; lending aid: N. one who helps or lends aid.—SYN. of 'assist': to help; aid; succor; relieve; second; back; support; favor; benefit; sustain; befriend; further.

ASSIZE, n. *ăs-sīz′*, plu. ASSIZES, *ăs-sī′zĕz* [OF. *assise*, a set rate, a tax, an assembly of judges: It. *assisa*, settled pattern of dress: L. *assessĭō*, a sitting—from *ad*, to; *sessus*, sat]: a session or sitting as of a court of justice; the set day on which a court is to be held; in *plu.*, a court of justice in England held two or three times a year in a county or circuit; *sing.*, in *OE.*, a statute regulating the measure and price of commodities. ASSIZE, v. to fix measures or rates; to settle. ASSIZ′ING, imp. ASSIZED, pp. *ăs-sīzd′*. ASSI′ZER, n. *-zėr*, one who. ASSIZE OF BREAD, in *OE.*, the settled rate for the sale of bread.

ASSIZE: a word literally signifying a 'sitting' or 'session': used in the principal European legal systems, and very much in the same sense, or rather senses, in all, for it has more than one distinctive meaning. As is common

with regard to most of the ancient British legal technicality, the Latin language, in the first instance (*assideo*), and then the French (*assis*), appear to have led to its introduction into the phraseology of the law of England and Scotland. In England the word may signify a jury (as in Scotland), and it is sometimes used to denote an ordinance, decree, or law. But in modern practice, it is commonly applied to the sessions or sittings of the judges of the superior law-courts, held periodically in each county, for administering civil and criminal justice. They are now appointed by commissions issued twice a year to the judges of the high court of justice, two judges being generally assigned to each circuit. The circuits are, since 1875, seven in number. The judges or commissioners sit by virtue of four several authorities: 1. The commission of the *peace;* 2. A commission of *oyer* and *terminer;* 3. A commission of general *jail* delivery. The other authority is, 4. That if *nisi prius,* which is a consequence of the ancient commission of A. being annexed to the office of justices of A. by the statute of Westminster the second. The circuit system does not extend to London and Middlesex, which have instead courts of *nisi prius,* which are held before the chief or other judge of the superior courts for the trial of civil causes, at what are called the London and Westminster sittings; these districts have also the central criminal court, with its enlarged jurisdiction.

The circuit courts of Justiciary in Scotland, of which there are three—the north, the west, and the south—resemble the assizes in England; but in civil causes their authority is very limited.

In the sense of an ordinance or law, the term A. has various applications, although chiefly in the more ancient systems of jurisprudence. Thus, the 'Assizes' of Jerusalem were, according to Gibbon's *Decline and Fall* (vol. xi. p. 93), a code of feudal laws for the kingdom of Jerusalem, formed 1099 by an assembly of the Latin barons and of the clergy and laity under Godfrey of Bouillon. There were also the 'Assizes' or ordinances regulating the price of bread, ale, fuel, and other common necessaries of life, all of which ordinances have been abolished. See COURTS: JUDGE: JUDICIARY: JURY TRIAL: FAIRS. ASSIZE' OF JERUSALEM, a code of laws in force in the Christian kingdom of Jerusalem and Cyprus. It consisted of two parts, the assize of the high court with jurisdiction over the nobles, and the assize of the court of burgesses, or code of the common people.

ASSOCIATE, v. *ăs-sō'shĭ-āt* [L. *associātus,* associated, united—from L. *ad,* to; *socĭo,* I join; *socĭus,* a companion: F. *associer*]: to make one person a companion to another; to join in company as a friend or companion: N. a companion; a partner. ASSO'CIA'TING, imp. ASSO'CIA'TED, pp. ASSOCIATION, n. *ăs-sō'shĭ ā'shŭn* [F.—L.]: the union of persons in a company, usually for mutual benefit; a society; connection, applied to ideas. ASSO'CIA'TIVE, a. *-tĭv,* having the quality of association. ASSO'CIA'TOR, n. one who.

Asso'ciable, a. *-ă-bl*, companionable. Asso'ciableness, n., or Asso'ciabil'ity, n. *-bĭl'ĭ-tĭ*, the quality of being companionable. Asso'ciateship, n. the state or office of an associate. Asso'cia'tional, a. *-shĭ-ā'shŭn-ăl*, pertaining to. Association of ideas, the process by which one idea when excited presents to the mind contiguous or similar ideas.—Syn. of 'associate, n.': companion; comrade; colleague; mate; partner; fellow; friend; ally; coadjutor;—of 'association': partnership; alliance; combination; society; company.

ASSOCIATED PRESS: a combination of newspapers for the collection and distribution of news for all journals identified with it. The pioneer in this field in the U. S. was J. W. Webb, who, 1829, founded the *Courier and Enquirer* in New York, and began to collect news from out-of-city parts, which he sold to his rivals. The first organization of newspapers was made in New York 1849, and named the Associated Press. It included such papers as the *Herald, Tribune, World, Mail and Express*, etc. The Western Associated Press was founded in Chicago, 1865, and the United Press Association in New York, 1882. A bitter competition arose between these three associations, which was greatly intensified by the organization of numerous smaller associations which took sides with one or the other of the three larger ones. Many compromises were arranged, but no adjustment was effected till 1892, when the United Press absorbed the Associated Press. In 1894 the United Press Local News Association was started in New York. Gradually the smaller associations were either forced out of business or absorbed. Thus, after a series of combinations, the Associated Press came once more into power, and practically monopolized the whole industry in the United States. The Associated Press has agents scattered all over the world, who send local news to their nearest headquarters, whence it is forwarded to the main office in New York. It is then distributed to the various members of the association. The country press and non-member newspapers are given the facilities of the Associated Press by purchasing the news at a price fixed in accordance with the amount of news taken daily or weekly.

ASSOCIATE PRESBYTERIAN CHURCH, in the United States: see United Presbyterian Church of North America: Presbyterian Church in the United States.

ASSOCIATE REFORMED PRESBYTERIAN CHURCH: see United Presbyterian Church of North America.

ASSOCIATE SYNOD—ASSOCIATE PRESBYTERY, etc.: designations adopted among the dissenters from the Church of Scotland. See Scotland, Church of: United Presbyterian Church. In the United States also there are an Associate Synod and an Associate Reformed Church, offspring of the Scottish Secession.

ASSOCIA'TION: see Co-operation: League: Company: Societies.

ASSOCIATION OF IDEAS.

ASSOCIATION OF IDEAS: the process by which an idea calls up, or is called up by, other ideas; sometimes known as successive association in distinction from simultaneous association, a phrase applied to the fusion into one conscious whole of a group of qualities, e.g., the colors in a painting. This is an important subject both for psychology and philosophy, as it relates to a pervading fact at the foundation of our intelligence. An exposition of this subject supplies an exposition of a number of the complex phenomena of mind more satisfactorily than if those phenomena were treated separately. What is meant by Association is illustrated by such occurrences as the following: When we see the sky becoming overcast, we think of rain as about to follow, the notion of rain not having previously been present in our mind. When we pass a house, we are reminded of its occupant; and meeting a person we know, we may be carried in thought to his office, and from that to other persons holding the same office, and so on. Besides the sights, and sounds, and touches caused by contact with real things, we are greatly occupied with sights, sounds, and touches, remembered, anticipated, or imagined, which is to live in a world of ideas; and it is in this world that the process termed Association has its sphere. The association between names and things comprehends one of the most important applications of the activity in question.

The circumstances under which one idea brings forward another into view are principally two—viz., first, previous *proximity;* and second, *likeness.* The terms 'Contiguity' and 'Similarity' are used in Philosophy to express them. The first is exemplified in the examples of association given above; for in most of those it will be found that the conjoined notions have been frequently experienced together, in consequence of which they have become part of the same whole. Thus, we have often noticed the darkened sky followed by a shower; the two facts have occupied the attention simultaneously, and in virtue of our mental organization, they have power each to suggest the other. This association results from proximity or contiguity. When one idea suggests another which was never in company with it before, it is generally through the force of some *likeness* between the two. I meet an old man in the street with a very peculiar face, which reminds me of the bust of Socrates. These two things had never accompanied one another in my mind before, and therefore it could not be the force of proximity that made the second arise at the instigation of the first; but there was a certain amount of likeness or similarity between the old man's features and the features of Socrates, as represented in the bust; and it is a fact of man's mental constitution, no less certain and no less important than the foregoing, that in cases where something now before the mind has a strong resemblance to something formerly observed or conceived, but not at present thought of in any way, the present is apt to recall the past idea, what-

ever it may be. Identification and comparison both imply that things are brought together in mind by virtue of their similarity, they not having been in company before. The principle of proximity operates most in Memory, Habit, and Routine; similarity becomes more significant in invention and originality, and is essential to the processes of Reason and creative Imagination.

Law of Contiguity.—The principle of association by contiguity is not confined to ideas. We must state it in a more comprehensive form, in order to comprise the full sphere of its application; for our mechanical habits are formed through the very same power of our constitution that enables us to recall or remember ideas. The habitual movements of a soldier or of a skilled workman are associated so firmly that one succeeds another almost of its own accord. Every thing in the nature of acquisition supposes a plastic property in the human nervous system, giving permanent coherence to acts that have been often performed together or successively. Indeed the order of revival among associated thoughts is now generally recognized as dependent upon the order in which the nervous activities of the brain are aroused.

The following is a general statement of the law under consideration:

Muscular Actions as well as Feelings, and Ideas, occurring together, or in close succession, tend to become so related that when any one of them is afterwards aroused the others are apt to arise with it.

And first, as to association of actions, or voluntary movements. When we perform a train of movements without any further aid of the will than to commence the series, there must be a fixed connection between each and the one that follows, and this connection may be either instinctive or acquired. There are various cases of involuntary trains, such as the action of the heart, lungs, and intestines. and the movements of deglutition. When a morsel of food reaches the back part of the mouth, the muscles of the throat seize hold of it, and transmit it to the stomach, independent of our will. The connected movements in this case are provided for in the original structure of the nervous and muscular system. In walking there is partly an instinctive tendency to alternate the limbs, and partly a confirming acquisition, the result of practice. But in those complicated operations that human beings are taught to execute in the various avocations of life, the associating principle is everything. The apparently simple and easy act of taking food is a complicated acquisition; in other words, an extensive group of associated sensations and movements. The grasping of the morsel is followed by the movement of the arm that carried it to the mouth; the mouth is opened simultaneously; after which follow the processes of biting and chewing; all of which take place with the certainty of a machine, and with little or no effort or attention directed to them. These associations were originally built up

by slow degrees. 'As a general rule, it takes many repetitions to cement so firm a union between successive and simultaneous movements as is implied in the above instance.'

A good example of the association of movements is furnished in our acquirement of spoken language, as is committing to memory words, sayings, and passages of books. When a child has perfectly acquired the Lord's Prayer, the chain of association is so firmly knit, that the words 'Our Father' are followed naturally by those next succeeding, and so on to the end. The cohesion in this case is ultimately between the vocal movements corresponding to the enunciation of the words. Having gone many times through this one definite succession, the nervous currents acquire a tendency to fall into this one definite track, and in future to bring on the movements in the exact order that they have so frequently followed.

The power of association is possessed to a considerable extent by animals, although it is doubtful if they employ association by similarity. We know that, other things being equal, associations are built up most readily in youth, health, and nutrition, and decay in old age, and during exhaustion and disease. And even to keep our acquisitions from fading away, it is requisite that they should be occasionally revived. A language acquired in early years may be utterly lost by disuse. Sustained practice seems particularly necessary in early education; children's acquisitions are very liable to disintegrate, if not kept up and confirmed by new additions.

Law of Similarity.—This may be expressed as follows: *Present* Actions, Sensations, Thoughts, and Emotions tend to revive their Like among *previous* impressions.

If the mind worked only by the principle of contiguity, nothing would ever occur to us except in some connection already formed. Things which are similar have some one or more properties in common. It is often held nowadays that these common properties stimulate partially identical nervous processes, and that our ability to connect experiences which are similar rests on this neural over-lapping.

A few examples may show the workings of this associating power, and the consequences thence arising. The intellectual operations known under the names Classification, Generalization, Induction, and Deduction, all proceed upon the discovery of likeness among things lying wide asunder in space and time, and very often veiled by diversity. Thus, in order to include in one list all the species of the *rose*, botanists have had to trace the characters of the genus through its various members, wherever they occur, and under the greatest differences in every other respect. It takes a keen identifying faculty—that is, a strong natural tendency for the resurrection of like to meet like—to see the resemblance of some of these species to the rest; and it has happened in many departments of knowledge that a class has remained incomplete for a time, purely from the disguised character of some of

the individuals. So in the process termed *induction*, by which a general law is arrived at by comparing instances of it everywhere, there must be an attraction of similars, in order to bring together in the mind the collection of particulars that the induction is based upon. Thus, Newton assembled in his view the various transparent bodies that he had found in the course of his experiments to refract or bend light strongly, his only intellectual instrument for doing so being the bond of likeness operating as a power of recall. Having looked at them in company, he saw that some were remarkable for their weight or specific gravity, and others for containing inflammable ingredients; upon which he raised the general induction, connecting these two properties with high refrangibility. Then, *deductively*, he applied this generalization to the diamond, which refracts light more than any other known substance; and as it is not a heavy material, he extended the other inference to it—namely, that it was made up of some inflammable material, an inference afterwards confirmed by the discovery that it is crystallized carbon. Many of the greatest discoveries in science have turned on the identification of modes of action never before supposed the same, as when Franklin was struck with the resemblance between the atmospheric thunder and lightning and the phenomena of common electricity.

Another wide field for the operation of the same principle is the region of *illustrative comparisons*, whereby two things widely remote are brought together, in the view either to elucidate one another, or for the sake of ornament and poetic effect. Most men of genius in literature and poetry have contributed original illustrations, similes, metaphors, or comparisons in the course of their compositions. Shakespeare carries the palm in this faculty. The writings of Bacon are remarkably rich in those that serve the purpose of exposition. Science is with him the 'interpretation' of nature: final causes are 'vestal virgins'; they have no fruit: fallacies are 'idols.' Edmund Burke, another master of illustrative comparison, has termed revolutions the 'medicine' of the state, and regular government its 'food.'

The permanence of the associations among mental processes is generally held to depend upon the recency, the frequency and the vividness with which they were impressed. By repetition almost any sequence of ideas or acts can be made enduring. Individuals vary greatly in their capacity to take on new associations rapidly, as well as in the capacity to retain them. Interest, rapt attention and some familiarity with the matter in hand are essential to the highest success.

The earliest known attempt to lay down the laws whereby thought succeeds to thought, is in Aristotle's treatise on Memory. He enumerates three different principles of mental resuscitation—viz., Similarity, Contrariety, and Co-adjacency. He has been followed by most other philosophers as regards all the three principles. It is

now, however, clearly seen and generally admitted, that contrariety is not an independent associating force. When a thing suggests its opposite or contrary, it will be found that the two have been previously together in the mind, and have therefore acquired a mutual hold by contiguity. Such, for example, are black and white, wet and dry, health and sickness, prosperity and adversity, etc. Contraries, in fact, have a natural inseparability; they are of the class of relatives like father and son, which imply each other necessarily, and have no meaning except by mutual reference. It requires no new principle of our constitution to account for suggestion in this particular case. Moreover, when things are strongly contrasted with one another, as high position before a fall, the mind is greatly impressed with the shock of transition, and so retains a lively recollection of the sequence, having by that means a greater tendency to pass from the one to the other. Thus then, the enumeration of Aristotle is reduced to the two principles that we have now expounded.

Hobbes recognized the principle of contiguity as the foundation of reminiscence. Hume's enumeration comprised the three principles of Resemblance, Contiguity, and Causation, which he illustrates as follows: 'A picture naturally leads our thoughts to the original (resemblance). The mention of one apartment in a building naturally introduces an inquiry or discourse concerning the others (contiguity). And if we think of a wound we can scarce forbear reflecting on the pain which follows it (causation).' Causation, however, is merely a case of contiguity; so also we may say of Order in Place, and Order in Time, which have been given as distinct principles. Similarity and contiguity have been held by certain authors to be reducible to one another, but it is practically convenient to distinguish them, whatever view is taken of their ultimate relations.

ASSONANT, a. *ăs'sō-nănt* [F. *assonant*—from L. *as'sŏnans* or *assŏnan'tem*, assonant, resounding—from L. *ad*, to; *sonans*, sounding]: resembling in sound. ASSONANCE, n. *ăs'sō-năns* [F.]: resemblance of sounds.

ASSORT, v. *ăs-sŏrt'* [F. *assortir*, to match, to agree—from L. *ad*, *sortīri*, to cast or draw lots—from *sortem*, a lot: It. *sorta*, a sort, a kind]: to arrange or put in lots; to arrange into sorts or classes; to agree or suit. ASSORT'ING, imp. ASSORT'ED, pp.: ADJ. put in lots; arranged. ASSOR'TER, n. one who. ASSORT'MENT, n. the act of separating into lots or arranging into classes; a number of things of the same kind.

ASSOUAN, *âs-swân'*, or ESSUAN', or ESWAN', ancient Syene: town of Upper Egypt on the bank of the Nile, near the borders of Nubia: 110 m. s. of Thebes; lat. 24° 5′ 30″ n., long. 32° 54′ e. There are few remains of the ancient city. Some granite columns present themselves among the ruins, but do not seem of an early date; and part of a temple stands with a dilapidated portico. Of the town-wall that part to the s. of the old town is still standing;

and beyond it is the cemetery of A. where there are numerous tombs, mostly cenotaphs with Arabic inscriptions. In the neighborhood are several granite quarries, some of them remarkable for remains of ancient material cut from the rock, and partially hewn, and for antique inscriptions and tablets, announcing the removal of blocks and the reign of the Egyptian monarch by whose order they had been quarried. The environs of A. are sterile and sandy; but the palm thrives, and the dates, which are excellent, form the staple of the trade. Some traffic is carried on in senna, henna, charcoal, wicker-baskets and slaves.

The ancient name Syene is the Coptic word *souan* or *suan*, signifying 'opening;' and the modern one is formed by adding the Arabic *el*, 'the,' softened into *es*, viz., *Es-suan*, 'the opening.' A. and its vicinity are highly interesting to geologists and mineralogists; the kind of granite called syenite receives its name from the town.

ASSOUAN DAM: the largest dam on the Nile, having a retaining capacity of 1,000,000,000 tons of water, and the principal structure in the extensive irrigation system established by the British. The dam was begun in 1898 and finished in 1902; with its canal and lock it cost about $7,000,000. The structure is properly 90 ft. high, though some of the work goes down 130 ft. The dam retains and raises the level of the river to 347 ft. above the sea. The base of the dam is 30 ft. wide and the top 23 ft. Its length is 6,397 ft., and as it closes the Nile to navigation a canal extends around the dam, with locks to raise and lower passing vessels. These now make the passage all the year round, whereas before the building of the dam they were able to pass the cataracts only when the Nile was at full water. The stone for the masonry of this dam was taken from the same quarry that supplied the temple of Philæ (near by) and Cleopatra's Needle (now in Central Park, N.Y.), and the granite workers found the marks of the wedges made 30 centuries before in separating the stone. About 1850 the first serious attempt was begun to improve the irrigation system of the Nile watershed. Dams and viaducts were constructed, which threw a portion of the water into six main irrigation canals below Cairo. The system was clumsy and advanced very slowly. In the latter part of the century a most extensive scheme of irrigation was undertaken by the British, including great dams at Assouan and Assiout. The contract for the Assouan dam was let early in 1898, and the foundation stone laid Feb. 12, 1899. Temporary rubble dams were first laid across three of the Nile channels below the site of the great dam, so as to break the force of the current, and maintain a pond of comparatively still water, in which the work of constructing the real dam could be carried on without interference. As the current was very swift at times these rubble dams were composed of large and heavy stones, from one to twelve tons in weight. In some cases old railway cars were loaded with stones, tied on with wire ropes and dumped over

the cataract. To fill the interstices between these great stones sand-bags were employed. These temporary dams proved satisfactory, and the work was pushed rapidly, as many as 11,000 men being employed at one time. While the substructure and piers of the A. D. are of masonry, there are between these 180 steel sluice-gates, for regulating the flow of water. The majority of these sluices are 23 ft. high and nearly 7 ft. wide. Most of the steel gates weigh 14 tons each, and although subjected at high water to a pressure of 450 tons they are so balanced and adjusted that they can be moved by hand. (See BALANCE-GATE.) This large number of gates is necessary because of the enormous volume of water carried by the Nile during the season of high water. When the river is rising the sluices are all open, so that the water passes freely, without depositing the fertilizing silt common to this river. After the flow, when the water has become clear, the gates are gradually closed and the reservoir above is kept filled. During the dry months, between May and July, the water is allowed to flow for irrigation purposes through canals where it may be needed. This system is of immense aid to the agricultural department of Egypt. See EGYPT, IRRIGATION, NILE.

ASSUAGE, v. *ăs-swāj'* [OF. *assouager* or *asoager*, to relieve, to assuage—from L. *ad*, to; *suāvis*, sweet]: to soften; to mitigate, to allay; to abate or subside. ASSUAG'ING, imp. ASSUAGED, pp. *ăs-swājd'*. ASSUAGE'MENT, n. mitigation. ASSUA'GER, n. one who. ASSUASIVE, a. *ăs-swā'zĭv*, softening; alleviating; soothing; mitigating.—SYN. of 'assuage': to allay; alleviate; relieve; pacify; mitigate; soothe; calm; tranquillize; appease.

ASSUBJUGATE, v. *ăs-sŭb'joo-gāt* [L. *ad*, and *subjugate*]: in *OE.*, to subjugate; to bring into subjection.

ASSUETUDE, n. *ăs'wĕ-tūd* [L. *assuetūdo*, custom—from *ad*, *sŭesco*, I become used]: custom; habit.

ASSUME, v. *ăs-sūm'* [F. *assumer*, to assume—from L. *assūmĕrĕ*, to take to myself—from *ad*, to; *sūmo*, I take; *sumptus*, taken]: to take a person or thing to one's-self; to take upon one's-self; to appropriate; to pretend to possess; to take for granted without proof. ASSUM'ING, imp.: ADJ. haughty; arrogant. ASSUMED, pp. *ăs-sūmd'*. ASSUM'INGLY, ad. *-lĭ*. ASSUM'ER, n. one who. ASSUMPTION, n. *ăs-sŭm'shŭn* (OF.—from L. *assumptus*, taken to one's-self]: the act of taking to one's-self; the act of assuming; supposition; the taking up into heaven, applied by Rom. Catholics to the Virgin Mary. ASSUMP'TIVE, a. *-tĭv*, that may be assumed. ASSUMP'TIVELY, ad. *-tĭv-lĭ*. ASSUMPSIT, n. *ăs-sŭmp'sĭt* [L. he has taken to himself]: in *law*, a voluntary promise to perform for, or to pay to, another; an action to recover damages for non-performance of promise.—SYN. of 'assume': to arrogate; usurp; appropriate; affect; pretend; apprehend; imagine; suppose; presume.

ASSUMPTION: village and river of Lower Canada. About 8 m. below the village, the river flows into the St.

Lawrence, or rather into the Ottawa, nearly opposite the lower extremity of the island of Montreal.

ASSUMPTION: city, cap. of Paraguay: see ASUNCION.

ASSUMP'TION OF THE VIRGIN MARY: a festival of the Roman and Greek churches, celebrated Aug. 15. In the 6th c., the idea that the soul and body of the Virgin had been carried up to heaven by Christ and his angels, which had originated in a Gnostic legend of the 3d or 4th c., began to gain credence in the church; and in the East at the beginning of the 7th c. (in the West at the beginning of the 9th c.) the festival of the A. was instituted in commemoration of the event. Until then, from the 4th c. the same date had been observed in memory of her death. Liguori, in his *Glories of Mary*, gives a very minute account of the circumstances of her Assumption.

ASSUR'ANCE: see INSURANCE.

ASSURANCE, COMMON: described by Blackstone as the legal evidence of the translation of property, whereby every man's estate is assured to him, and all controversies, doubts, and difficulties are either prevented or removed. For common assurances or *conveyances*, see DEED and CONVEYANCE.

ASSURE, v. *ă-shôr'* [F. *assurer;* OF. *asseuer*, to secure, to prop up—from mid. L. *assēcūrĕ*, to give security by a pledge—from L. *ad*, to; *secu'rus*, sure, certain]: to make sure by a token of good faith; to make certain; to give confidence by a promise; to insure, ASSUR'ING, imp. ASSURED', pp. *ă-shôrd':* ADJ. certain; convinced; boldly confident; in *OE.*, affianced. ASSUREDLY, ad. *ă-shô'rĕd-lĭ.* ASSUR'EDNESS, n. the state of being assured. ASSUR'ER, n. ASSURANCE, n. *ă-shô'răns*, a declaration to dispel doubt; the utmost certainty; impudence; conviction; a contract to make good a loss by death or by fire, now restricted to life contingencies.—SYN. of 'assure': to assert; vouch; avouch; declare; aver; protest;—of 'assurance': impudence; boldness; audacity; hardihood; effrontery; shamelessness; confidence; hope; expectation; trust.

ASSURGENT, a. *ăs-sėr'jĕnt* [L. *assurgen'tem*, rising—from *ad*, to; *surgo*, I rise]: in *bot.*, rising in a curve.

ASSWAGE, v. *ăs-swāj':* old spelling of ASSUAGE, which see.

AS'SYNT: mountainous, moorish, and very rugged dist. or parish, 25 m. long, 15 broad, of Scotland; consisting mostly of a network of rocky heights, interspersed with a multitude (200) of dark, motionless tarns or pools, of various sizes, with some large lochs, the largest Loch Assynt, $6\frac{3}{4}$ m. long and 1 broad. The district consists of gneiss, Silurian rocks, and primitive limestone. There are a dozen mountains 2,000–3,273 ft. high. Some of the mountains are covered with white bleached stones and protruding rocks like patches of snow. The mountains have frequently the form of artificial pillars and cairns, and are the remains of an enormous denudation of the

nearly horizontal strata of the district. Suilven is in form a sugar-loaf, rising 2,399 ft. above the sea, amid a rugged table-land of lower gneiss hills. To Ardvreck Castle, on a promontory on the east side of Loch A., the great Marquis of Montrose was brought prisoner, 1650.

ASSYRIA, *ăs-sĭr'ĭ-ă:* (called Athura on Persian cuneiform inscriptions, and Assura on the Median): the northernmost of the three great countries that occupied the Mesopotamian plain; bounded on the n. by the Niphates Mountains of Armenia; on the s. by the Susiana and Babylonia; on the e. by Media; and on the w., according to some, by the Tigris, but more correctly by the watershed of the Euphrates, for many Assyrian ruins are found w. of the Tigris. It was thus nearly 500 m. long from n. to s., and rather more than 150 broad from e. to w. This plain is diversified by mountain-chains on the n. and e., and watered by the Tigris and its affluents, between two of which—the Zab rivers—lay the finest part of the country, called Adiabené. As it was the boundaryland between the Semitic people and Iran, it became the scene of important political events. Its extraordinary fertility enabled it to support a large population. The high degree of prosperity and civilization reached by its inhabitants in very early times is attested not only by ancient writers, but by the extensive ruins of mighty cities, by the canals and contrivances for irrigation, and by the many proofs—furnished by recent excavations—of an acquaintance with the arts and sciences. The ruins of many cities are grouped around Nineveh; while lower down the Tigris exhibits an almost unbroken line of ruins from Tekrit to Bagdad. Under the Mohammedans, this fine country is now almost a desert.

History.—Ancient authorities differ widely from each other respecting the rise and progress, the extent and the duration of the Assyrian empire. Ctesias, a Greek of Cnidus, court-physician to Artaxerxes Mnemon, is quoted by various ancient writers; and his information, though utterly incredible and fabulous, has been followed by most classical historians, and by the whole series of ecclesiastical writers. Many ingenious but futile attempts have been made to reconcile his history with the Scripture narrative. Berosus, a priest of Bel at Babylon, who wrote about B.C. 268, and Herodotus, differ widely from Ctesias, but are confirmed in many important particulars by the Bible, and by the continually increasing evidence derived from cuneiform inscriptions.

In the Bible narrative, we are told that Nineveh was founded by Asshur from Babylon (Gen. x. 11). The latter city therefore must have been the capital of a more ancient empire, as Berosus asserts, and recent discoveries go far to prove, though Greek writers maintain the reverse. The next notice we have of A. does not occur till Pul, king of A. invaded Palestine, but was bought off by Menaham, king of Israel. Tiglath-pileser, who succeeded Pul, conquered Syria, and carried off many of the Jews

into captivity. Next Salmanezer subdued Israel, which, at the instigation of the Egyptians, had refused to pay tribute. The next is Sennacherib, who attacked Egypt, and threatened Judah under Hezekiah. He was slain by his two sons, and succeeded by his son Esarhaddon, who was also master of Babylon (2 Chron. xxxiii. 11), which, under Nabonassar, had been independent of Nineveh since B.C. 747. Very little credit is to be attached to the expedition of Holofernes recorded in the book of Judith.

After this, the empire appears to have gradually decayed, until at last, in the reign of Sardanapalus II., of Saracus, a league was formed for its destruction between Nabopolassar, governor of Babylon, and Cyaxares, king of Media, which was strengthened by the marriage of Nebuchadnezzar, son of the former, to Nitocris, daughter of the latter. The war and siege are said to have been interrupted by an invasion of the Scythians, which drew off Cyaxares; but at length Nineveh was taken and destroyed about B.C. 606, or, according to Rawlinson, 625. In the time of Darius Hystaspes, A. rebelled without success in conjunction with Media. In the time of Herodotus, the capital had ceased to exist; and when Xenophon passed it, the very name was forgot, though he testifies to the extent of the deserted city, and asserts the height of the ruined walls to be 150 ft. An inconsiderable town seems to have existed on its ruins in the reign of Claudius; and the last notice we have of Nineveh in the classics is in Tacitus.

According to the Greek legends, the Assyrian empire was founded by Ninus. To this monarch and his consort Semiramis are ascribed expeditions on an incredibly magnificent scale against Bactria, Ethiopia, and India. We are told that Semiramis led an army of 3,000,000 infantry, 500,000 cavalry, and 100,000 chariots, and a fleet of 2,000 ships, and was encountered by forces more numerous still, and defeated; that she returned to Nineveh, where she soon afterwards died, and was reckoned among the gods, and was succeeded by her son Ninyas, an effeminate prince. The succeeding part of the history as related by Ctesias is equally false, though that writer managed to make the ancient world give credit to his narrative in preference to that of Herodotus. He gives a list of monarchs from Ninus to Sardanapalus, which is now considered a clumsy forgery. According to him, for thirty generations after Ninyas, the kings led a life of luxury and indolence in their palace; the last of them, Sardanapalus, made a vigorous defense against Arbaces, the rebel governor of Media, but finding it impossible to defend Nineveh, he set fire to his palace, and burnt himself with all his treasures; this event took place 1,306 years after Ninus. Now, the above account represents Nineveh to have perished nearly three centuries before the real date, which was about B.C. 605; also it is utterly incompatible with Scripture. Herodotus assigns to the empire a duration of 520 years, and Berosus of 526. In order to reconcile these conflicting accounts, historians have supposed that Nineveh was twice

destroyed, but this supposition is now generally rejected. However, that Nineveh was actually destroyed by fire is proved from the condition of the slabs and statutes found in its ruins, which show the action of intense heat.

A. became a Median province B.C. 605, and afterwards in conjunction with Babylonia, formed one of the satrapies of the Persian empire. In B.C. 331 A. at Gaugemela, near Arbela, in A., Alexander defeated Darius Codomannus. In B.C. 312, A. became part of the kingdom of the Seleucidæ, whose cap. was Seleucia, on the Tigris. It was afterward subject to the Parthian kings, whose cap. was Ctesiphon, and was more than once temporarily in possession of the Romans. When the Persian monarchy of the Sassanides was destroyed by the successors of Mohammed, A. was subject to the caliphs. Their seat was Bagdad from A.D. 762–1258. It has been under the Turks from 1638, at which period it was wrested from the Persians.

Some historical points now to be mentioned have been satisfactorily ascertained from the cuneiform inscriptions.

It has not been ascertained when A. first became independent of Babylon (q.v.). The seat of government was first at Asshur (now *Kileh-Shergat*), on the right bank of the Tigris, 60 m. s. of the later capital, Nineveh. At this place have been found the bricks and fragments of vases bearing the names of the earliest known Assyrian kings, for Ninus and Semiramis are to be considered mere inventions of Greek writers. The earliest known king is *Bel-lush*, one of a series of four. These reigns probably occupy from B.C. 1273 to 1200. Of the next series of six, the names of five are recorded on the famous Kileh-Shergat cylinder, the earliest purely historical document as yet discovered in Mesopotamia.

Tiglethi-nin, the last of the Kileh-Shergat series, was succeeded by his son, Asshur-dani-pal, the warlike Sardanapalus I. of the Greeks. He made Calah, the modern *Nimrud*, his capital, 40 m. further n. on the left bank of the Tigris. His annals are very complete. Among other conquests, he mentions that he had taken tribute from Tyre, Sidon, and other Phœnician cities. He was founder of the n.w. palace at Nimrud, which, next to that of Sennacherib at Koyunjik, is the largest and most magnificent of all the Assyrian edifices. The greater portion of the sculptures now in the British Museum are from this building.

Sardanapalus I. was succeeded by his son Shalmanubar, whose deeds are briefly recorded on the black obelisk now in the British Museum, the full account being apparently reserved for the colossal bulls, which seem to have been the usual dedication after a victory. Of his campaigns, the most interesting to us are those in which he defeated Ben-hadad of Damascus, and Ben-hadad's murderer and successor, Hazael. According to his own account, Shalmanubar defeated Hazael, killing 16,000 of his fighting-men, and capturing more than 1,000 chariots (B.C. 884). The obelisk also records the tribute paid by *Yahua, son of Khumri,*

i.e., Jehu, son of Omri, king of Israel. Now Jehu was son of Jehoshaphat, and had done his utmost to extirpate the family of Omri; but probably Jehu, like other usurpers, was anxious to identify himself with the family which he had dispossessed, and of course the Assyrians accepted the title he gave himself.

Iva-lush, probably the Pul of the Scriptures, is recorded on a pavement-slab from Nimrud to have received tribute from Samaria, Tyre, Damascus, Idumæa, and Palestine, which assertion agrees with the account given (2 Kings, xv.) of the 1,000 talents paid by Menahem. With this king ends the first dynasty, in which we have 18 monarchs from Bel-lush to Iva-lush (B.C. 1273–747).

The later Assyrian empire begins with Tiglath-pileser II. (B.C. 747), and ends with the destruction of Nineveh (B.C. 625). It is plain from Scripture that the empire was in a flourishing condition during the reigns of those kings who came in contact with the Hebrews, and this account exactly accords with the monuments, but contradicts Herodotus. Probably, on the accession of Tiglath-pileser II., Babylon had revolted, and this partial rebellion had reached Herodotus in an exaggerated form. The annals of this prince exist in only a very fragmentary state. The name of his successor, Shalmaneser, has not yet been found on the monuments. The capture of Samaria is usually ascribed to this prince, but his successor, Sargon, expressly asserts that Samaria was taken by himself in his first year. Sargon's palace at *Khorsabad*, near Nineveh, furnished the valuable series of monuments now in the Louvre. Sargon was succeeded by his son, Sennacherib. He fixed the seat of government at Nineveh, and employed the forced labor of 360,000 men to repair the great palace. Later in his reign he built a new and more magnificent edifice, which he decorated with sculptures representing his various exploits. This is the palace excavated by Layard. It contained at least three spacious halls—one of them 150 ft. by 125, and two long galleries, one of 200, the other of 185 ft., besides innumerable chambers. The excavated portion covers above eight acres. The annals of Sennacherib extend only to his eighth year. He relates at length his successful attack upon Babylon, his invasion of Judæa, the submission of Hezekiah, and his deportation of 200,000 Jews. This expedition is not to be confounded with the second invasion, in which he failed ignominiously, and which is not recorded on his monuments. His assassination very shortly after his return from Nineveh, after his second expedition, readily accounts for this silence.

Esarhaddon, his son and successor, held his court sometimes at Nineveh, sometimes at Babylon. Bricks bearing his name have been discovered at *Hillah*, and a tablet at Babylon dated in his reign. This explains how Manasseh was brought to him at Babylon, when he was led captive from Jerusalem (2 Chron. xxxiii.) No record has yet been discovered of this expedition against Palestine. His edifices

are not inferior to those of his predecessors. He employed Greek and Phœnician artists, and to them probably are due the beautiful bas-reliefs that adorn the edifices of his erection. The decline of the empire probably commenced with Asshur-bani-pal II. The arts of peace flourished, while the military vigor of the nation declined. The sculptures of this reign are decidedly superior to the earlier in spirit, delicacy, and freedom from conventionality. The slabs show that hunting, not war, was this king's favorite pursuit. He was succeeded by his son, Asshur-emit-ili, the last king of whom any records have yet been discovered. It is uncertain whether Nineveh was destroyed under him or under a successor, the Saracus of Berosus, the effeminate Sardanapalus of the Greeks. The character usually given of this last king, as a debauchee throwing off his indolent habits, and after performing prodigies of valor, perishing by a glorious death, rather than surrender, is derived solely from Ctesias. All we distinctly know is that, finding himself betrayed to the Median king by Nabopolassar, governor of Babylon, he set fire to his palace and perished in the flames.

The collection of Assyrian tablets in the British Museum includes a curious series of legends, among them a copy of the story of the Flood. The tablets were originally at least 12 in number, forming one story or set of legends, the account of the Flood being on the 11th tablet. Of the inscription describing the Flood, there are fragments of three copies, containing duplicate texts. These texts belong to the time of Asshur-bani-pal (abt. B.C. 660), and were found in the library of that monarch in the palace at Nineveh. The original text, according to the statements on the tablets, belonged to the city of Erech, and appears to have been either written in or translated into the Semitic Babylonian at a very early period. The Assyrian story of the Deluge is both like and unlike the Scripture narrative. The Flood is sent as a punishment for sin; the builder of the ark is called Sisit (the *Xisuthrus* of the Græco-Chaldæan Berosus); he gathers into the vessel all his male and female servants, all the sons of the army, and all the beasts of the field; the storm of rain lasts only six days, and yet submerges the whole earth; all life is destroyed; Sisit sends forth a dove which can find no resting-place, and returns; then a swallow, which is also forced to return; then a raven, which does not come back. The ark rests on a mountain, the animals are liberated, an altar is built by the grateful patriarch, and Bel, the Great God, makes a 'covenant' with Sisit. The minuter details of this Assyrian legend diverge greatly from the Hebrew account, and lead to the conclusion that in each we have an independent tradition of some great natural catastrophe in the early ages of human history.

Government.—The government was despotic, as suited the character of the people. The empire was a mere congeries of kingdoms bound to the supreme authority only by certain obligations of paying tribute, giving presents,

and showing due respect. Each kingdom retained its own rulers, laws, and religion, although we do find some attempts to rule by satraps and collectors of tribute. Tiglath-pileser also boasts, in an inscription, of having punished and crucified the Chaldæans who refused to worship his gods. In consequence of this imperfect organization, the empire was exposed to frequent revolts of the subject nations, when such opportunities offered as a disputed succession, or want of energy in the ruling prince. Then the labor of conquest had to begin anew, and it was sought to diminish the danger of the central power by inflicting severe punishments on the rebels. The history of the Jews has made us familiar with one of these devices—viz., the wholesale deportation of the inhabitants of the offending district. It may be readily believed that such an empire, though imposing from the magnificence and wealth of the capitol, yet from the impoverishment and weakness of the subject states, was continually liable to fall to pieces, and was ill-fitted to resist an attack from without. That A. did actually last for five centuries, was owing to its long succession of warlike princes, and to the energy of the population.

Religion.—The religion of the Assyrians was nearly identical with that of the Babylonians. It was a gross polytheism, their gods being thousands in number, and each village having its own particular deity. From thousands of theological tablets now in the British Museum, it is known that each divinity had many names, and some of them as many as fifty titles besides. Again, many deities prominent in the Babylonian pantheon are either unknown or subordinate in the Assyrian. Besides, the same gods did not remain equally popular throughout. The supreme god was Asshur, probably the deified patriarch. His worship was confined to Assyria. He is generally associated in the inscriptions with *Nin* and *Nergal* (2 Kings, xvii. 30), who are represented by the man-bull and the man-lion. The winged globe, so often seen in the sculptures, from which a figure with a horned helmet shoots his arrows, is supposed to be the emblem of Asshur. Next in rank is the governing triad, answering to the Pluto, Jupiter, and Neptune of the classical mythology; the next group corresponds to Æther, the sun and the moon; then five inferior deities, representing the five planets. Each god is associated with a goddess. Mylitta, or Beltis, is the 'queen.' The male and female powers of the sun are represented in the Scripture phrase, 'Adrammelech, and Anamelech, gods of Sepharvaim'—that is, of Sippara, a town a few miles above Babylon. *Belmerodach* was originally an inferior deity, son of Héa, the fish-god; but under the later Babylonians, we find him monopolizing the greater part of the homage which used previously to be divided among several. Nisroch (2 Kings, xix., 37) has not been yet ascertained. Nebo (Isaiah, xlvi.) is one of the five planetary gods, and corresponds to Mercury. The systems of notation, divisions of time, the

planets and stars, animals and metals, divination and astrology, were all more or less closely connected with theology.

Ethnology.—The Assyrians have been assigned by some ethnologists to the Aryan race, but it is now generally acknowledged that they were a branch of the Semitic family of nations, and therefore were members of the same grand division of the human race as the Syrians, the Phœnicians with their colonies, the Jews, and the modern Arabians. In B.C. 20th c., Semitism, as a distinct ethnic element, appears to have first developed itself. The original races variously called Scythic, Turanian, or Tatar, appear to have once been spread over the whole space from the Caucasus to the Indian Ocean, and from the Mediterranean to the mouths of the Ganges. Their type of language has continued to our time to exist in four-fifths of Asia, and in some of the remoter corners of Europe, as among the Finns, Lapps, Turks, and Hungarians. In Mesopotamia, and in the valley of the Nile, where natural advantages induced men early to form settled communities, the rude and inartificial type of language was developed into Hamitism, and afterwards still further improved into Semitism. Then seems to have commenced a series of migrations. Asshur went forth probably at this time from Babylon to A., Abraham and his followers to Palestine, the Joktanian Arabs to Arabia. From these seats, Semitism was afterward carried to Cyprus, to the s. seaboard countries of Asia Minor, to Carthage, Sicily, Spain, and Western Africa.

The traditions of A. indicate a very early connection between Ethiopia, Arabia, and the cities on the Euphrates. Mesopotamia undoubtedly contained a large proportion of Arabians, and this accounts for the fact that Herodotus styles Sennacherib king of the Arabians and Assyrians. The Chaldæans, colonies of whom were planted in Armenia by the Asyrian kings, are supposed by some to have been a foreign tribe, which had immigrated from the n., and become a priestly caste. But the *Akkad* race, of which the Chaldæan is a tribe, is with more probability thought to have inhabited Babylonia from the remotest times, and by it the earliest civilization in Mesopotamia was originated. Probably the art of picture-writing was possessed by the Hamitic tribes who lived in the valley of the Nile, and passed eastward to the Euphrates. The *Akkad* language appears to have been formed before Semitism attained its peculiar development and organization. Long after Semitism had become predominant in Mesopotamia, the *Akkad* or Chaldæan alphabet continued to be the scientific language in which all the tablets relating to mythology, astronomy, or science, as well as most historical and official records, were written. This alphabet was adopted with certain modifications by the Semitic tribes, which became predominant in Assyria. The cuneiform characters were elaborated from the forms of natural objects, and gradually became phonetic from being symbolic, and

for convenience of engraving, assumed the form of arrow-heads instead of the rounded and flowing forms which are introduced by the use of plastic materials. After the Aryan race had spread more extensively in Western Asia, the Persian monarchs, when they wished to make any communication to their subjects generally intelligible, found it necessary to publish it in three languages belonging to the principal divisions of human speech; hence the trilingual inscriptions of Behistun, etc., which consist of an Indo-European, a Tatar, and a Semitic column. It is still necessary in many places to employ three tongues, representatives of the three families, Persian, Turkish, and Arabic.—See Lenormant, *La Langue Primitive de la Chaldée.*

Art.—Although Assyria was the pupil of Babylon in art, as in other things, yet there was a notable difference between the two. Babylon developed the art of painting, while Assyria excelled in sculpture. The Assyrian artists did not strive to express the ideal to any great extent, although their emblematic figures of the gods possess both dignity and grandeur; but their best work was in the representation of the real.

The march, the onset, the pursuit, the siege, the passage of rivers, the submission and treatment of captives, secretaries noting the number of heads taken in battle, and the amount of spoil; the chase of the lion, of the antelope, of the wild ass, and other animals—such are the favorite subjects of the Assyrian sculptor. Nor are they treated in the conventional style of Egypt, but in a manner which, for grace, spirit, correctness, and delicacy of execution, excels everything else known in Asiatic art. The artists follow some modes of representation different from the modern; for instance, a bull has five legs given him, in order that from all points of view he may be seen with four; a ladder stands edgeways against a wall, to show it is not a pole. A truthful impression is always aimed at. The labor bestowed on the careful finish of a priest's dress, and in the tasteful decoration of an article of furniture, proves them to be the work of an ingenious and painstaking people. We gain, however, comparatively little information respecting the private life of the Assyrians. There are a few which represent the foddering of cattle, women riding on mules, etc.

It is natural to suppose that Nineveh—a wealthy and luxurious city—imported many of the products of other countries, yet the manufactured goods would mainly be of home production. The jars, bronzes, glass bottles, carved ornaments in ivory and mother-of-pearl, engraved gems, bells, earrings, arms, utensils, are of excellent workmanship. The ornaments especially are in good taste, and evince no inconsiderable skill in the working of metals. Transparent glass was not unknown, nor the use of the lens as a magnifying agent. The Assyrians knew the principle of the arch, the use of the lever and roller, and the construction of aqueducts and drains. In the arts of

peace, they appear to have been not inferior to any ancient nation; while their conquests, and the long duration of their empire, suffice to prove their capacity for war.—See Rawlinson's *Five Great Monarchies of the Ancient World*, George Smith's *Assyrian Discoveries* (1875), *Assyria*, and *The Assyrian Eponym* (1875); Sayce, *Assyria* (1885), and *Fresh Light from the Ancient Monuments* (1886); Maspero, *The Dawn of Civilization;* and Jastrow, *Religion of Babylonia and Assyria* (1898).

ASSYRIAN, a. *ă-sĭr'ĭ-ăn:* of or pertaining to Assyria: N. an inhabitant of. ASSYRIOL'OGIST, n. *-ŏl'o-jĭst*, one who makes the antiquities and history of Assyria his special study.

ASTACOLITE, n. *ăs-tăk'ō-līt* [Gr. *astăkos*, the crayfish or lobster; *lithos*, a stone]: a term applied to the fossil remains of crustaceans, like the crayfish or lobster.

AS'TACUS: see CRAYFISH: LOBSTERS.

ASTARTE, *ăs-târ'tē* (*Ashtaroth* in the Old Test.): chief female deity of the Phœnicians, Carthaginians, and Syrians (Syria Dea), worshipped also by the Jews in times when idolatry prevailed. A. was the original from which the Greeks borrowed their Aphrodite (q.v.). As Baal was god of the sun, A. was goddess of the moon. Her chief temples were in Tyre and Sidon. According to ancient accounts, her worship was of a licentious character. The oldest known image of her—that in Paphos—represented her simply under the form of a white conical stone. In Canaan and Phœnicia she was subsequently typified under the form of a cow, or sometimes she had only a cow's or bull's head; still later, her emblem became a star; and finally, she was conceived of as the 'queen of heaven,' sitting on a lion, her head surrounded with rays, and in the one hand a thunderbolt, in the other a sceptre.

ASTAR'TE: genus of Mollusca, with bivalve shells; type of a family *Astartidæ*, very closely allied to the *Veneridæ* or Venus family. It is interesting chiefly with reference to geologic changes and the history of life and organization, because only a few species are now known to exist, and these limited to the North Atlantic and Arctic oceans; whereas the fossil species are extremely numerous, commencing with the *lias* period, and distributed over the whole world. The Astartidæ may be regarded as having given place to the Veneridæ, which commenced with the oolitic period, and are among the most abundant bivalve mollusca of the present time.

ASTATIC, a. *ăs-tăt'ĭk* [Gr. *a*, without; *statos*, that stands or remains]: an arrangement for two or more magnets in a manner to have their effects act in opposition so that their directive force is very small, being the difference of the effects of the magnets considered singly. This arrangement is used only in making sensitive electrical measuring instruments. See ELECTRICAL MEASURING INSTRUMENTS.

A-STAY′: the position of an anchor when, during heaving, the cable forms an angle with the surface of the water in line with the stays of the ship.

ASTEISM, n. *ăs′tē-ĭzm* [Gr. *asteismos*—from *asteios*, urbane; *astu*, a city]: in *rhet.*, refinement of speech; urbanity of manners.

ASTELMA, n. *as-tĕl′ma* [Gr. *a*, without; *stelma*, a girdle]: genus of plants belonging to the order *Asteraceæ*. The species are beautiful Cape shrubs with 'everlasting' flowers.

ASTER, n. *ăs′tėr* [Gr. *astēr*, a star]: genus of plants of the nat. ord. *Compositæ*, which Lindley has therefore chosen to call *Asteraceæ*. The flowers have a star-like arrangement. The ray and the disk are of different colors. The genus contains a great number of species, both herbaceous and shrubby, which have been arranged into six or seven groups, regarded by many as distinct genera. Only one species, *A. Tripolium* or *Tripolium vulgare*, the Sea Starwort, is a native of Britain. It is common in salt marshes. A number of perennial species are in cultivation as garden-flowers, of which the New England A. (*A. Novæ Angliæ*) and the Michaelmas Daisy (*A. Tradescanti*), both natives of N. America, are perhaps the most common, and, with some of the other species, are prized as among the comparatively few flowers to be seen at that dull season when autumn is giving place to winter. But the best known and most valued of all the asters is the China A. (*A. sinensis*), a summer annual of which many varieties are in cultivation, and new ones are continually introduced. It was brought from China in the earlier part of the 18th c. The varieties exhibit great diversities of form and color. The plant delights in a rich free soil. In the n. parts of the United States, the seed is usually sown in April in a hot-bed, or in pots under a frame, and the young asters are planted out in the open air in May. They flower from July to the end of autumn.—*A. argophyllus*, or *Haxtonia argophylla*, is a shrub, native of Van Diemen's Land, smelling strongly of musk. There are not less than 50 species of wild A. in e. and central United States, giving great beauty to our autumn foregrounds.

ASTERABAD′: see ASTRABAD.

ASTERACANTHUS, n. *ăs′tėr-ă-kăn′thŭs* [Gr. *aster*, a star; *akantha*, a thorn or spine]: a genus of fossil fin-spines of fishes, often of large size, having their surfaces richly ornamented with star-like tubercles.

ASTERIA, n. *ăs-tē′rĭ-ă*, or ASTERITE, n. *ăs′tėr-īt* [Gr. *aster*, a star]: a variety of corundum or star sapphire, which, when cut in a certain way, shows a bright opalescent star of six rays. ASTERIATED, a. *ăs-tē′rĭ-ā′tĕd*, radiated; star-like.

ASTE′RIAS and ASTERI′ADÆ: see STARFISH.

ASTERISK, n. *ăs′tėr-ĭsk* [Gr. *asteris′kos*, a little star—from *aster*, a star]: a sign or symbol (*), used in writing

and printing, as a reference to a note at the bottom or on the margin of the page. The obelisk (q.v.), or dagger (†), and many other marks, are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The A. and other similar signs may have any arbitrary meaning assigned to them at the will of the writer, an explanation of the signification being given. Omission of words may be marked with two or more stars. The Greek grammarians, or critics, used the A. to mark a passage that had been unjustly suspected, but was to be held as genuine, or a passage in any way remarkable; the obelisk marked an interpolated or an objectionable word or passage.

ASTERN, ad. *ă-stėrn′* [AS. *a*, on or at, and *stern*, behind]: at the stern; in or at the hinder part of a ship; behind. To GO ASTERN, to move backward as a vessel, as from the action of currents of the wind. To BACK ASTERN, to move backward.

ASTEROID, n. *ăs′tėr-oyd* [Gr. *aster*, a star; *eidos*, likeness]: one of the minor planets between the orbits of Mars and Jupiter. See PLANETOIDS. AS′TEROI′DAL, a. pertaining to the small planets. ASTERISM, n. *ăs′tėr-ĭzm*, a cluster of stars; a constellation.

ASTEROIDEA, n. plu. *ăs′tėr-oy′dē-ă* [Gr. *aster*, a star; *eidos*, resemblance]: the order of animals of which the common five-rayed star-fish is the type; an order of *Echinoderms* having one opening to the alimentary canal, and a rayed or star-like structure. AS′TEROID, n. *-oyd*, one of the asteroidea: ADJ. of or pertaining to; rayed; star-like.

ASTEROLEPIS, n. *ăs′tėr-ō-lē′pĭs* or *-ŏl′-* [Gr. *aster*, a star; *lepis*, a scale]: a gigantic ganoid fossil fish of the old red sandstone.

ASTEROPHYLLITES, n. plu. *ăs′tėr-ō-fĭl′īts* [Gr. *aster*, a star; *phullon*, a leaf]: genus of fossil plants abundant in the coal-measures, and called sometimes Star-leaf, from their star-like whorls of linear leaves. They are usually considered the branches of the *Calamites* or *Calamodendron*.

ASTHENIC, a. *ăs-thĕn′ĭk* [Gr. *a*, without; *sthenos*, strength]: weak; debiliated. ASTHENIA, n. *ăs-the-nī′ă*, in *med.*, want or loss of strength; debility. AS′THENOL′OGY, n. *-ŏl′ŏ-jĭ* [Gr. *logos*, discourse]: a discourse on diseases connected with debility.

ASTHENOPIA, *ăs′thĕn-ō′pĭ-a*, weakness of the eyes, in which a sustained effort at vision is fatiguing. A. may be due to refractive errors or to weakness of the muscles of the eye, or it may be part of a general nervous weakness —neurasthenia.

ASTHMA, n. *ăst′mă* [Gr. *asthma*—from *ăō*, I blow, I breathe]: a disease of the organs of breathing attended with cough and difficulty of breathing. ASTHMATIC, a.

ăst-măt'ĭk, or ASTHMAT'ICAL, a. *-ĭ-kăl*, troubled with difficulty of breathing.

ASTHMA. A. is a disease or group of diseases the distinguishing feature of which is shortness of breath coming on in attacks of longer or shorter duration, the subject being in the intervals (in the early stages at least) in apparent health and able to breathe easily and naturally. After the disease has persisted a considerable time there is usually more or less permanent shortness of breath following slight exertion. The affection usually begins in early life and the first attack often follows a catarrhal trouble of the nasal mucous membrane or of the bronchi. The attacks may recur spontaneously at regular or irregular intervals or they may be excited only by certain causes; the disease may persist throughout life or the tendency to the attacks may disappear as old age comes on, or there may be no recurrence after one or two paroxysms. An asthmatic paroxysm occurs usually in the night; it may be preceded by no premonitory symptoms, or the patient may be warned of its imminence by a peculiar elation of spirits or the reverse, by extreme drowsiness or by wakefulness, or by some other unusual state which he has learned to regard as a forerunner of the dreaded attack. The history of a typical attack is about as follows: With or without any warning the previous day, the sufferer is awakened, generally some time after midnight, by the difficulty of breathing; sometimes when he first awakes he is breathing naturally and wonders what has disturbed his rest, but a sudden suffocative fit soon removes all doubt as to what ails him. The breathing becomes more and more labored and it seems as though every wheeze must surely be the last and that suffocation will end the scene. The sufferer sits or stands by the open window with his hands on the back of a chair or resting his elbows on the window-sill, trying with all his force to enlarge still more the already widely expanded chest. The face is anxious and pale and covered with cold beads of perspiration, the eyes are staring and the pupils dilated, the pulse is small and rapid. The breathing is slow, the expiration being unduly prolonged, but the attempt at inspiration follows immediately. The attack lasts perhaps one hour or two and then its violence begins to subside, but some shortness of breath not uncommonly persists into the forenoon or even throughout the day following. All attacks are not so severe as the one just described; in some cases indeed they may be so slight as to be scarcely noticeable. The nature of A. is not definitely determined, but it is generally held to consist in a spasmodic contraction of the bronchial muscles; other theories are that it is due to swelling of the mucous membrane of the smaller bronchial tubes, and that it is a result of spasm of the diaphragm. It is usually associated with a catarrhal bronchitis, or at all events a paroxysm is almost always succeeded by the coughing up of little round balls of mucus or of larger masses of stringy

mucus and pusulent matter. The existing causes of the attack are various. A hearty evening meal may cause it, or the eating of some special article, such as strawberries, may bring on an attack. The inhalation of dust, of the pollen of certain plants, or of smoke is a frequent existing cause—especially of the asthma associated with hay-fever (q.v.). A paroxysm may follow wetting of the feet or sitting in a draft, or it may apparently be brought on by overfatigue or by worry or some mental disturbance of either pleasant or disagreeable nature. Locality often has a peculiar influence on the attack, one person suffering only when in a certain place while another may find that a residence in the same locality ensures him freedom from attack. A story is told of two friends in in England, both asthmatics, who were debarred from exchanging visits, since each invariably had an attack if he attempted to pass a night at the house of the other. Both were free from this trouble when in London and it was only there that the friends could enjoy each other's society. The treatment of A. resolves itself into attempts to relieve the paroxysm and the renewal of the tendency to the attacks. Inhalation of the smoke from burning nitre paper or belladonna leaves is the method most commonly used to relieve the paroxysm; the inhalation of nitrite of amyl or the administration of nitroglycerine internally has also been recommended. Sometimes a cup of hot black coffee without sugar, or a glass of hot water containing sweet spirits of nitre will afford relief. It is the unfortunate experience of most sufferers, however, that these remedies are of little or only temporary service and not to be depended upon. In the general treatment of A. the cause of the attacks must be sought, and removed if possible. The asthmatic must have a regular hygienic life, eating moderately, the heartiest meal being in the middle of the day, indulging very little or not at all in alcoholic beverages, and getting his full quota of seven or eight hours' sleep in a thoroughly ventilated room. He should take good care of the skin by means of cool bathing or a cold sponge every morning, or morning and evening, followed by a brisk rub with a coarse towel. Without being over-timid or fussy one should try to avoid the usual causes of 'catching cold,' such as sitting with wet feet or in a draft. A frequent cause of asthma is a faulty condition of the interior of the nose—a deviation of the septrum or an outgrowth from it, a permanent thickening of the mucous membrane, the pressure of a polypus, etc. In every case of A., therefore, it is wise to have the nose examined, for the removal of one of the conditions just mentioned has resulted repeatedly in a lasting cure.

ASTI, *ăs'tē* (*Asta Pompeia*): city of Piedmont, govt. of Alessandria, on the left bank of the Tanaro, on the railway from Turin to Genoa, 26½ m. e.s.e. of Turin. It is a large town, with walls considerably dilapidated, and the streets generally very narrow and irregular. It is the seat

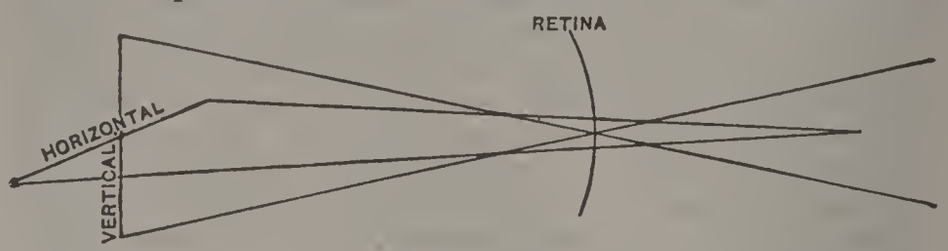
of a bishop, and has a court of justice and a royal college. There is carried on a considerable trade in silk and woolen fabrics, leather, and hats, as well as in wines and agricultural produce. A. is a town of high antiquity, having been famous for its pottery before its capture by the Gauls, B.C. 400. On the occasion of its being again taken and destroyed in an irruption of the Gauls, it was rebuilt by Pompey, and received the name of Asta Pompeia. In the middle ages, A. was one of the most powerful republics of Upper Italy. It was captured and burnt by the emperor Frederick I., 1155; and after a series of vicissitudes, it came into the possession of the Visconti of Naples, by whom it was ceded to the French, in whose hands it remained till the middle of the 16th c., when it came into the possession of the Dukes of Savoy, as it still remains. Alfieri was born here, 1749. Pop. about 38,000.

The district of Asti, one of the six subdivisions of the govt. of Alessandria, is bounded on the w. and n. by the province of Turin, s. by Alba, s.e. by Alessandria Proper and n.e. by the province of Casale. The surface is hilly and picturesque. The soil rests upon limestone abounding in fossils, and is fertile, producing corn, fruit, and wine. It is celebrated for a fine white wine resembling champagne, called *vino d'Asti*. Silk is one of its most important products.

ASTIGMATISM, n. *a-stĭg'ma-tĭzm* [Gr. *a*, without; *stigmatizō*, to prick, to puncture]: condition of the eye in which parallel rays of light are not brought to a focus by the media. It is a frequent cause of defective eyesight. A. in the vast majority of cases is due to irregularity in the curvature of the cornea; though it may arise from imperfections in the lens, irregular contraction of the ciliary muscle, or possibly defect in the retina. In the normal eye, parallel rays are brought to a focus accurately on the retina. In the myopic and hypermetropic eyes, rays are brought to a focus, though not on the retina; but in the astigmatic eye, rays of light never come to a focus either on the retina or elsewhere. According to the laws of refraction, the smaller the curve of the refracting body the shorter the course of the traversing ray. If, therefore, in one meridian of the cornea, the curvature is smaller than that at right angles to it, it is evident that rays of light traversing the smaller curve will be brought to a focus sooner than the rays traversing the greater curve. Suppose a case in which the vertical meridian brings rays accurately to a focus on the retina, but in which rays passing through the horizontal meridian are brought to a focus behind the retina, as shown in the accompanying diagram (in which Vertical denotes rays striking the cornea from a meridian standing as it were upright before the eye, while Horizontal denotes rays striking the cornea from a meridian extending from side to side before it.

It will be seen that at no one place is an actual focus obtained, both of the rays from the horizontal meridian and

of the rays from the vertical meridian—that when the latter are focused on the retina, the former have not yet reached a point; and on the other hand, when the former rays have reached a focus the latter rays are far divergent, having come to a point and crossed at the retina. This condition



may exist in various forms: (*a*) simple hypermetropic A., in which the rays in one diameter fall on the retina, but rays at right angles fall behind: (*b*) simple myopic A., the exact reverse of the preceding, rays in one diameter being focused on the retina and the rays at right angles being brought to a focus in front of the retina: (*c*) compound hypermetropic A., in which all rays fall behind the retina, but some further back than others: (*d*) compound myopic A., in which all rays fall in front of the retina, but some further in front than those at right angles to them: (*e*) mixed A., a form in which rays in one meridian fall behind the retina, and in the meridian at right angles the rays are focused in front of the retina, a combination of hypermetropia and myopia in the same eye. The effect of A. is to blur outlines of objects, rendering them much less distinct and clear cut. A. is also frequent source of headache, and of many of the nervous phenomena of civilized life. Many sufferers have been permanently relieved of their headaches by the accurate fitting of glasses which correct their astigatism.—A. is corrected by means of cylindrical glasses, either alone or in combination with spherical lenses which unequally refract light, bringing parallel rays to different foci to suit each case. See Refraction, Errors of.

ASTIR, ad. *ă-stėr′* [AS. *a*, on, and *stir*]: on the move; active.

AS′TON, William George, Irish philologist: b. near Londonderry in 1841. He became interpreter and translator to the British Legation at Yedo, in 1870; assistant Japanese secretary at Yedo, in 1875-82; consul-general for Korea, in 1884; Japanese secretary at Tokio, in 1886; and was retired in 1889. He published *A Grammar of the Japanese Spoken Language; A Grammar of the Japanese Written Language; A Translation of the Nihongi; or, Annals of Ancient Japan; History of Japanese Literature,* etc.

ASTONE, v. *ăs-tōn′*, or Astony, v. *ăs-tōn′ĭ*]see Astonish]: in *OE.*, to confound with fear and amazement; to terrify; to astonish. Astonied, pp. *ăs-tŏn′ĭd*, for *astonished*, a word occasionally occurring in Scripture., *e.g.*, Job xvii, 8.

ASTONISH, v. *ăs-tŏn′ĭsh* [OF. *estonner*, to amaze—from

L. *attonārĕ*, to thunder at, to stress—from L. *ad*, to; *tono*, I thunder: AS. *a*, intensive, *stunian*, to make stupid with noise]: to strike dumb as with fear or wonder; to fill with sudden fear and wonder; to amaze; to confound with surprise. ASTON'ISHING, imp. ASTON'ISHED, pp. *-ĭsht*. ASTON'ISHINGLY, ad. *-lĭ*. ASTON'ISHMENT, n. confusion of mind from fear or wonder; amazement; the cause of amazement. SYN. of 'astonish': to surprise; amaze; astound; overwhelm.

ASTOR, *ăs'tor*, JOHN JACOB: 1763–1848; b. in a village near Heidelberg, Germany. After spending some years in London, he came to America, 1783, and soon invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired $200,000. He became the founder of the American Fur Company, and although the increasing influence of the English Fur Companies in N. America was unfavorable to his plans, he ventured to fit out two expeditions to the Oregon territory—one by land, and one by sea—the purpose of which was to open a regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the war of 1812 stopped its prosperity for a time. From this period A.'s commercial connections extended over the world, and his ships were found in every sea. At his death he left property amounting to $30,000,000. He left a legacy of $400,000 for the establishment of a public library in New York. See ASTOR LIBRARY. His wealth was mainly inherited by his son, WILLIAM B., who continued to augment it till his death in 1875, when he is said to have left more than $50,000,000. He added $450,000 to his father's bequest for a public library. He was known as the 'landlord of New York' from the extent of his property in that city.

ASTOR, WILLIAM WALDORF: great grandson of John Jacob A. the elder, and son of John Jacob A. 2d: b. New York, 1848, Mar. 31. He was educated by private tutors in the United States and Europe; graduated at the law school of Columbia College 1875; was elected a member of the state assembly 1877 as a republican, and the state senate 1879, serving on the committees on militia, cities, judiciary, commerce and navigation, and public expenditures; was defeated for member of congress 1880; was appointed U. S. minister to Italy, succeeding the late George P. Marsh, 1882; and held the office till 1885. He practiced his profession but a short time, and excepting his public duties has applied himself to the care of the vast landed estate of his family. In his leisure he has published two Italian romances, *Valentino* (New York, 1886), and *Sforza: a Story of Milan* (1889). He settled in London 1890, and was naturalized a citizen of Great Britain 1899. He inherited one of the vastest estates of modern times.

ASTORGA, *âs-tor'gâ*, EMANUELE D': b. 1680, in Sicily:

musician. His father, a baron of Sicily, in the contest respecting the annexation of the island to Spain, was delivered to the enemy by his own mercenary soldiers, and was put to death 1701. Through the interest of the Spanish Princess Ursini, A. was educated in a monastery at Astorga in Leon. Here he made great progress in music, and afterward was at the court of the Duke of Parma, and of the Emperor Leopold. His best work is the *Stabat Mater*, a masterly composition, of which the original score is preserved in Oxford.

ASTORIA, *ăs-tō′rĭ-a:* city, cap. of Clatsop co., Or.: at the junction of the Young's and the Columbia rivers, near the mouth of the Columbia; 98 m. n.w. of Portland, 555 m. n. of San Francisco. It was founded by John Jacob Astor, 1811, as a fur-trading station. It has a harbor affording unlimited anchorage; defended by Fort Stevens on the s. side of the entrance to the Columbia, 6 m. below the city, and by Fort Canby on the n. side, 12 m. below; and undergoing improvement by the federal govt. on an appropriation of $1,300,000. The business portion is built entirely on piles over tide-water, on the s. bank of the river, here 4 m. wide, and the residence streets rise in parallel terraces on the face of a lofty hill. The city is a port of entry, and has more than 3 m. of excellent wharfage front. Water is brought 11 m. to a reservoir holding 3,000,000 gallons, giving a pressure of 240 ft. at tide-water; the water-works system cost $100,000. The city has electric light (cost $75,000) and gas plants. It contains public high and graded schools, 6 church edifices (Bapt., Congl., Meth. Episc., Presb., Prot. Episc., and Rom. Cath.), Odd Fellows' temple, Rom. Cath. hospital, a national bank (cap. $50,000), a private bank, and daily and weekly newspapers. Salmon fishing and canning are principal industries: there are about 40 canneries in the city and suburbs; average value of the season's salmon catch, $2,500,000. Lumbering also is an important industry, about 400,000 ft. per day of logs being 'driven.' The city ships largely to San Francisco and Liverpool. Pop. (1900) 8,381; fishing season 10,000.

ASTOR LIBRARY: a chartered institution, given to the city of New York by the will of John Jacob Astor, who died, 1848, leaving a legacy of $400,000 for the purpose. From this amount the original building of the library in Lafayette Place was erected, and opened to the public, 1854, Jan. 1. Two years later, William B. Astor, eldest son of the former, gave land adjoining, on which was erected a second building, of the same dimensions as the first, and to these two has since been added a third similar structure. The entire edifice is connected, and forms a frontage of about 200 ft., with a depth of 105 ft. and a height of 70 ft. William B. Astor added to the original bequest about $250,000 during his life, and, by a codicil to his will, $200,000 additional. His son, John Jacob A. 2d (1822, June 10—1890, Feb. 22), bequeathed the trustees

$400,000, directing that the net income should be expended from time to time in the purchase of books to be added to the library and for no other purpose; and a further sum of $50,000 as a permanent fund whose income should be used only for paying the trustees the sum of $10 each for attending each regular meeting of the corporation. These bequests brought the entire donations of the Astor family to the library in land, books, and money to nearly $1,500,000. In 1895 the A.L. was consolidated with the Lenox Library and the Tilden Trust under the title of the New York Public Library (q.v.), but it still continued to be the main reference library of the city, occupying the original building. On the completion of the new public building the collections of the A.L. will be transferred there.

ASTOUND, v. *ās'townd'* [see ASTONISH]: to strike dumb with amazement. ASTOUNDING, imp. ASTOUNDED, pp.

ASTRABAD, *âs'tra-băd':* town in the n. of Persia, cap. of the province of A.; at the foot of the n. slope of the Elbruz Mts., on a small river which runs into A. Bay, at the s.e. extremity of the Caspian. It is 20 m. from the Caspian Sea; lat. 36° 50′ n., long. 54° 31′ e. It was long the residence of the Kajar princes from whom the present shah of Persia is descended; but on account of its situation in a remote corner of the kingdom, it was not made the metropolis, and it has sunk in importance. It is still inclosed by a dry ditch and mud-wall, 3 m. in circumference, but its great towers have disappeared. Trade has increased since the establishment of a Russian consulate. The causeway constructed by Shah Abbas is kept in good repair, and connects A. with Khorassan, Afghanistan, etc. The town is very unhealthful during the summer rains. Pop. 6,000–10,000.

ASTRADDLE, ad. *ă-străd'dl* [AS. *a*, on, and *straddle*]: with the legs on opposite sides of a thing.

ASTRÆA, n. *ăs-trē'a* [Gr. *aster*, a star]: the goddess of justice; one of the minor planets. ASTRÆIDÆ, n. plu. *ăs-trē'ĭ-dē*, the family of star-coals, so called from the great development of their radiating septa. ASTRÆ'AN, a. pertaining to Astræa; favored by her presence.

ASTRÆA, *ăs-trē'a:* daughter of Zeus and Themis, or of Astræus and Aurora, was the goddess of justice, the last of all the goddesses who left the earth when the golden age had passed away and men began to forge weapons and perpetrate acts of violence. She took her place in heaven as the constellation Virgo in the zodiac.—Greek art usually represented her with a pair of balances in her hand, and a crown of stars on her head.—A. is also the name of one of the Planetoids (q.v.).

ASTRÆ'A, ASTRÆIDÆ: see CORAL: MADREPORE.

ASTRAGAL, n. *ăs'tră-găl* [L. *astrăg'ălus;* Gr. *astrag'alos*, the upper joint of the neck, the ankle-joint]: a small circular or semicircular bead; the ring-like molding round

the top and bottom of the column of a pillar; the beaded zinc bars used by zinc-workers in making diamond and ornamental window-frames. ASTRAGALUS, n. *ăs-trăg'ă-lŭs*, in *anat.*, a bone of the foot, which, by a convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os calcis*, or heel-bone, to which it is attached by a strong ligament. In front, it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot: it is at this joint that inversion and eversion of the foot take place. It is evident that the A. is a bone of great importance to the member, as it supports the weight of the body in standing, and enters into most of the movements of the foot. It is occasionally displaced, usually in front of the outer ankle.

ASTRAGAL'EÆ: see ASTRAGALUS.

ASTRAGALOMANCY, *ăs-trăg'a-lo-măn'sĭ* [Gr. *astragalos*, dice; *manteia*, divination]: pretended divination performed by throwing down small dice with marks corresponding to letters of the alphabet, and observing what words they formed. It was practiced in the temple of Hercules in Achaia.

ASTRAGALUS, *ăs-trăg'ă-lŭs:* genus of plants of the nat. ord. *Leguminosæ*, sub-order *Papilionaceæ*. The pod is more or less perfectly 2-celled. The leaves are pinnate, with a terminal leaflet. The species are numerous, shrubby, and often spiny, or unarmed and herbaceous. A number of the shrubby species yield the substance called Tragacanth (q.v.), or Gum Tragacanth.—*A. Boëticus* is cultivated in Hungary, Germany, and other parts of Europe, for its seeds, which are roasted, ground, and used as a substitute for coffee, or mixed with it to improve its flavor.—The Sweet Milkvetch, or Wild Licorice (*A. glycyphyllos*), a native of Britain and other parts of Europe, perennial, with long and very thick roots, which penetrate deep into the soil, and almost prostrate stems, 3 feet in length, is occasionally cultivated for food of cattle. In the w. and s.w. United States there are various species, including *A. caryocarpus*, the Ground Plum; and *A. Mollissimus*, or 'loco-weed,' which is supposed to have caused the death of many thousand horses and cattle. In Vermont and n. occur 2 highland species.

ASTRAKANITE, *âs'tra-kan-īt* [Gr. *astrakanit*—from Astrakan (q.v.)]: mineral with whitish crystals; same as blœdite.

ASTRAKHAN, *âs-trâ-kân':* originally a province of the Mogul empire, but united with the Russian empire, 1554. At present A. forms one of the s.e. governments of Russia in Europe; bounded on the s. by the Caspian Sea and the Caucasus; on the w. by the country of the Don Cossacks;

on the n. by the govt. of Saratov; and on the e. by Orenburg; 91,285 sq. m. The province of A. is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts. Salt is procured from the marshes of the steppes, considerable numbers of cattle are reared, and the annual value of the sturgeon-fishing in the Volga is as much as 2,500,000 roubles (about $2,000,000). The climate varies from 70° F. in summer to 13° in winter. Pop. (1897) 994,775, composed of Russian, Tartar, and a great diversity of elements.

ASTRAKHAN′: chief town of the govt. of A.; on an island of the Volga, near the Caspian Sea; lat. 46° 21′ n., long. 48° 4′ e. It is the seat of a Greek abp. and an Armenian bp.; has numerous churches and mosques, an Indian temple, a gymnasium, a seminary for priests, a botanical garden, and many manufactories. The houses are mostly of wood, irregularly built. The fisheries in the Volga supply occupation to many inhabitants of A. and its neighborhood. The principal exports are leather, linen, and woolen goods, salted sturgeon, caviar, and isinglass. Imports are chiefly gold-embroidered silken goods from Persia, silk stuffs, woolen goods, rice, rhubarb, raw silk, drugs, etc. From July to Oct. the neighborhood of A. is frequently visited by swarms of locusts. Pop. (1887) 73,710; (1897) 113,001.

ASTRAKHAN: a fine curly kind of fur on the pelts of young lambs, the products of a variety of sheep found in Bokhara, Persia, and Syria.

ASTRAL, *ăs′trăl* [Gr. *aster*, a star]: belonging to the stars; starry. Astral Body, in Theosophy (q.v.), a sort of spiritual body detachable from man's material body during life, and subsisting after the death of the material body. Astral Lamp, a kind of Argand lamp casting an uninterrupted light from under a concave glass. Astral Spirits, spirits which, in some eastern religions, were supposed to animate the heavenly bodies. The star and fire worship of the eastern religions rested on the doctrine that every heavenly body is animated by a pervading spirit, as it were, a soul; and this doctrine passed into the religio-physical theories of the Greeks and Jews, and even into the Christian world. In the demonology or spirit-systems of Christendom in the middle ages, Astral Spirits are conceived of sometimes as fallen angels, sometimes as souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth and hell. Their intercourse with men and their influence were variously represented. In the 15th c., the demonologists, or special students of this subject, systematized the strange fancies of that wild period; and A. S. were made to occupy the first rank among evil or demoniacal spirits. Paracelsus, however, and others attributed to every human being an astral spirit, or sidereal element in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies. Astral Lamp, lamp similar to an Argand lamp (q.v.).

ASTRANTIA, *as-trăn′shĭ-a* [Gr. *astron*, a star; *anti*, here implying comparison with]: Masterwort; genus of plants of order *Umbelliferæ*. Masterwort misapplied to cow-parsnip.

ASTRAPÆA, *ăs′tra-pē-a* [Gr. *astrapaios*, pertaining to lightning]: genus of plants belonging to the order *Sterculiaceæ*, tribe *Dombeyæ*. It has large heads of flowers so splendid in color that they suggested the generic name.

ASTRAY, ad. *ă-strā′* [AS. *a*, on, and *stray*]: out of the right way or proper place.

ASTRICT, v. *ă-strĭkt′* [L. *astrictus*, drawn tight—from *ad*, to; *strĭngo*, I bind]: to bind firmly; to contract. ASTRICTION, n. *ă-strĭk′shŭn*, the act of binding close or contracting; the contraction of parts by the application of medicaments. ASTRICTIVE, a. *ă-strĭk′tĭv*, binding; also ASTRICTORY, a. *ă-strĭk′tėr-ĭ*.

ASTRIDE, ad. *ă-strīd′* [AS. *a*, on, and *stride*]: with the legs apart.

ASTRIFEROUS, a. *as-trĭf′ėr-ŭs* [L. *astrum*, a star; *fero*, I bear]: bearing stars; starry. ASTRIGEROUS, *as-trĭj′ėr-ŭs*, carrying stars.

ASTRINGE, v. *ă-strĭnj′* [L. *astringĕrĕ*,. to bind or tie tight together—from *ad*, to; *stringo*, I bind fast]: to bind tightly together; to contract by pressing together. ASTRING′ING, imp. ASTRINGED′, pp. *-strĭnjd′*. ASTRINGENT, n. *ă-strĭn′jĕnt* [L. *astrin′gens* or *astringen′tem*, binding or tying fast]: that which contracts or draws together muscular fibre; the opposite of laxative; the principle in bark that tans hides for leather: ADJ. binding. ASTRIN′GENCY, n. *-jĕn-sĭ*, the power of contracting parts, as the soft solids of the body. ASTRIN′GENTLY, ad. *-lĭ*.

ASTRIN′GENTS: medicines used for contracting the animal fibres and canals, so as to check fluxes, hemorrhage, and diarrhea. The drugs most commonly used as A. are alum, catechu, oak-galls, rhatany-root, etc. Many of the vegetable A. owe that property, in whole or in great part, to tannin. A severe degree of cold is a powerful astringent, as is also a high degree of heat; moderate heat, however, is relaxing.

ASTRIPOTENT, a. *ăs-trĭp′o-tĕnt* [L. *astrum*, a star; *potens*, powerful]: ruling the stars.

ASTROCARYUM, *ăs-trō-kā′rĭ-ŭm* [from the Gr. *astron*, a star, and *karyon*, a nut]: a genus of Palms, of which about sixteen species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines—in some cases, a foot long—with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnated leaves; some of them are lofty, others of very moderate height, as 8–15 ft., while some are almost altogether stemless. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the MURUMURÚ palm (*A. Murumuru*), the pulp of which is said to resemble a melon in flavor,

has a sort of musky odor, and is highly esteemed. It is 8–12 ft. high, abundant about Pará and elsewhere on the Amazon. Another edible fruit is that of the TUCUMÁ palm (*A. Tucuma*), abundant in the same regions. These fruits are about an inch long, the Murumurú ovate, the Tucumá almost globular. The Tucumá palm is 30–40 ft. high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The TÚCÚM palm (*A. vulgare*), a species quite distinct from the Tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous, is cultivated with care on account of the epidermis of its unopened leaves, of which they make cordage, useful for bow-strings, fishing-nets, etc. The fibre is fine, strong, and durable, and may perhaps become important as an article of commerce. The fibre is obtained by cutting down the terminal bud or column of unopened leaves which rises from the centre of the crown of foliage. The tender leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles which shrivel up almost to a thread. These are tied in bundles, and dried, and afterwards twisted into thread, or made into thicker cords, by mere rolling and manipulation.

ASTROGNOSY, n. *as-trog′nō-sĭ* [Gr. *astron*, a star; *gnosis*, inquiry, knowledge]: knowledge of the stars.

ASTROGRAPHY, n. *ăs-trŏg′ră-fĭ* [Gr. *aster* or *astron*, a star; *grapho*, I describe]: a description of the stars.

ASTROID, n. *ăs-troyd′* [Gr. *astron*, a star; *eidos*, form]: in *her.*, a mullet.

ASTROITE, n. *ăs-trō′īt* [Gr. *astron*, star; *lithos*, stone]: any star stone, i.e., stone of a radiate structure or superficially radiated; specially, an ancient gem, called by Pliny *asteria*. Some have thought this the mineral cat's-eye, others amianthus or asbestos inclosed in quartz.

ASTROLABE, n. *ăs′trō-lāb* [Gr. *astron*, a star; *labein*, to take]: name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere (see under ARMILLA), were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sight for taking altitudes, was known as an A. in the palmy days of astrology, and was the badge of the astrologer. The A. has been superceded by the instruments of modern astronomy. See QUADRANT: SEXTANT.

ASTROLATRY, n. *ăs′trŏl′ă-trĭ* [Gr. *astron*, a star; *latreï′a*, worship]: the worship of celestial bodies; star-worship.

ASTROLITHOLOGY, *ăs-tro-lĭ-thŏl′o-jĭ* [Gr. *astron*, a star; *lithos*, a stone; *logos*, a discourse]: the science which treats of meteorites or aerolites.

ASTROLOGY, n. *ăs-trŏl′ŏ-jĭ* [Gr. *astron*, a star; *logos*, discourse]: a science that pretends to foretell events by observing the stars. ASTROL′OGER, n. *-jĕr*, a person who

pretends to foretell events by the stars. ASTROLOGICAL, a. *ăs′trō-lŏj′ĭ-kăl*, or ASTROLOGIC, *-ĭk*, pertaining to. AS′TROLOG′ICALLY, ad. *-ĭ-kăl-ĭ*. ASTROLOGIZE, v. *ăs-trŏl′ŏ-jīz*, to practice astrology. ASTROL′OGI′ZING, imp. ASTROL′OGIZED′, pp. *-jīzd′*.

ASTROL′OGY: originally nearly the same as *astronomy*, 'the knowledge of the stars'; at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till recently, cultivated mostly with a view to (judicial) astrology. A. is one of the most ancient forms of superstition; it prevailed among the nations of the East (Egyptians, Chaldæans, Hindus, Chinese) at the very dawn of history. The Jews became much addicted to it after the captivity. It spread into the West and to Rome at about the Christian era. Astrologers were an important class at Rome, where they were called Chaldæans and Mathematicians; and though often banished by the senate and emperors under pain of death, and otherwise persecuted, they held their ground. The Roman poet Manilius, author of an astronomical poem still extant, was addicted to A.; and even Ptolemy the astronomer did not escape the infection, which in his time had become universal. A., which accords well with the predestinarian doctrines of Mohammedanism, was cultivated with great ardor by the Arabs from the 7th to the 13th c. Some of the early Christian fathers argued against the doctrines of A., others received them in a modified form. In its public capacity the Roman Church several times condemned the system; but many zealous Rom. Catholics have cultivated it. For centuries the most learned men continued devoted to this delusive science; Regiomontanus, the famous mathematician Cardan, even Tycho Brahé and Kepler could not shake off the fascination. Kepler saw the weakness of A. as a science, but could not bring himself to deny a certain connection between the positions ('constellations') of the planets and the qualities of those born under them. The Copernican system gave the death-blow to A. When the earth itself was found to be only one of the planets, it seemed absurd that all the others should be occupied in influencing it. The argument has really little force, but it produced the effect. Belief in A. is not now ostensibly professed in any Christian country, though a few solitary advocates have from time to time appeared; and ignorant impostors use it to get money from the superstitious. But it still holds sway in the East, and among Mohammedans everywhere. Even in Europe the craving of the ignorant for divination is still gratified by the publication of multitudes of almanacs containing astrological predictions, though the writers no longer believe in them.

Many passages of old writers are unintelligible without some knowledge of astrological terms, numbers of

which have taken root in the language. In the technical rules by which human destiny was foreseen, the heavenly *houses* played an important part. Astrologers were by no means at one as to the way of laying out those houses. A very general way was to draw great circles, through the the n. and s. points of the horizon, as meridians pass through the poles, dividing the heavens, visible and invisible, into twelve equal parts—six above the horizon, and six below. These were the twelve houses, and were numbered onward, beginning with that which lay in the e. immediately below the horizon. The first was called the house of life; the second, of fortune, or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death, or the upper portal; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies, or of captivity. The position of the twelve houses for a given time and place —the instant of an individual's birth, for instance—was a *theme*. To construct such a plan was to *cast* the person's nativity. The houses had different powers, the strongest being the first; as it contained the part of the heavens about to rise, it was called the *ascendant*, and the point of the ecliptic cut by its upper boundary was the *horoscope*. Each house had one of the heavenly bodies as its *lord*, who was strongest in his own house. The important matter was to ascertain what house and star was in the ascendant at the moment of a person's birth, from which it was deemed possible to augur his fortune. It followed that all people born in the same part of the world at the same time ought to have had the same future, an allegation which experience decisively contradicted. Even apart from this, astrological predictions of all kinds had a fatal tendency to pass away without being fulfilled; and when, finally, it was discovered that the earth was not the centre of the universe, but only a planet revolving around another body, and itself much exceeded in size by several of its compeers, every scientific mind in Europe felt itself unable any longer to believe in astrology, which has been in an increasingly languishing state since the middle of the 17th century.

ASTRONOMICAL AND ASTROPHYSICAL SOCIETY OF AMERICA: a national society whose members must possess technical knowledge of astronomical and astrophysical science. Membership 175.

ASTRON'OMY: science of the heavenly bodies; properly divided under three heads. 1. *Geometrical or Mathematical A.*, including the exact determination of the numerical and geometrical elements of the heavenly bodies—that is, their distances, shapes, magnitudes, the orbits that they describe in their motions, etc. 2. *Physical A.*, or the nature of the attractive forces that carry on the heavenly motions, the laws that they observe, and the calculation of the motions from a knowledge of these laws. 3. *Sidereal A.*, or whatever is ascertained regarding the universe of the fixed stars. *Practical A.* might

form another division, which would include a knowledge of the various astronomical instruments; and a familiarity generally with the rules and calculations by which the requisite results are deduced from observations.

For parts of this extensive subject, see ABERRATION OF LIGHT: AEROLITES: CIRCLE: COMET: ECLIPSES: EQUATOR: LIBRATION: METEORS: MOON: NEBULAE: PARALLAX: PLANETOIDS: PLANETS: PRECESSION: REFRACTION: SOLAR SYSTEM: STARS: SUN: TRANSIT INSTRUMENT, etc. See also the principal names mentioned in the brief sketch of the history of astronomical discovery which follows here.

The history of A. dates from a very early period. It is the most ancient of all sciences. The Chinese, Hindus, Chaldæans, Egyptians, and especially the Greeks, are known to have investigated the heavens very long before the Christian era. But with the first four nations, A. may be said to have been a sentiment rather than a science—a vague notion built up out of crude speculations, rather than a correct theory founded on systematic observation. In China, A. was intimately associated with state politics; the Indians, Chaldæans, and Egyptians made it a matter of religion; and each of these nations applied it to astrological purposes. In Greece alone was it prosecuted for its own sake.

The Chinese, Chaldæans, Hindus, and Egyptians each claim the honor of having been the first students of A., and each has had advocates of its claim. The Tirvalore tables (asserted by the Hindus to belong to an epoch of B.C. 3102—the commencement of the Cali-yug, or iron age, of their mythology—at which period a conjunction of the sun, moon, and planets is said to have occurred) are, so far as their date is concerned, altogether untrustworthy. Modern calculations have conclusively proved that no such conjunction could possibly have taken place at the time specified; and the elements of the tables are, in the general opinion of scientific men, of a character far in advance of the actual observations of that period. There is no doubt that the epoch is fictitious—that the date of these tables is fixed much earlier than their internal evidence justifies; but it is a question whether they were the result of the observations of Hindus themselves at some later period before the Christian era, or whether they were constructed after that era from data furnished to them by the Arabs or Greeks. Those who hold the former view, quote the well-known mathematical attainments of the Indians, and their aversion to intercourse with foreigners, as arguments in its favor; those who support the latter, point out that the tables are a mean between those of Ptolemy and Albategnius, or Al Batani, a distinguished Arabian astronomer, and therefore likely to have been derived from these two sources. Those who are interested in

the question of the originality of these tables, may refer to Delambre, and to Bailly's *Hist. de l'Astronomie Indienne.*

The Chinese have astronomical annals claiming to go back to B.C. 2857. In these there is little record of anything but of the appearance of comets and solar eclipses; and regarding the latter phenomena they tell nothing, save the fact and date of their occurrence. Professional astronomers were compelled to predict every eclipse under pain of death. The popular idea was, that an eclipse was a monster having evil designs on the sun, and it was customary to make a great noise, by shouting, beating of gongs, etc., in order to frighten it away from its solar prey. The many eclipses which the Chinese report have been recalculated, but not more than one anterior to the time of Ptolemy could be verified. At an early period, however, the Chinese appear to have been acquainted with the luni-solar cycle of nineteen years (introduced into Greece by Meton, and since known as the Metonic Cycle), and they had also divided the year into 365¼ days. Solstitial observances are said to have been made by means of a gnomon, B. C. 11th c. To the burning of all scientific books by one of their princes (Tsin-Chi-Hong-Ti), B. C. 221, the Chinese attribute the loss of many theories or methods previously in use. The precession of the equinoxes was not known to the Chinese until A. D. 400, but long before that they were familiar with the motion of the planets.

The mass of evidence points to the plains of Chaldæa as the primal seat of observational A. The risings and settings of the heavenly bodies and eclipses were subjects of observation and notation by their priests at a very remote period. Simplicius and Porphyry mention that there was transmitted to Aristotle from Babylon, by order of Alexander the Great, a catalogue of eclipses observed during 1,903 years preceding the conquest of that city by the Macedonians. Ptolemy gives six of the eclipses from this catalogue, but the earliest does not extend further back than B. C. 720. The probability therefore is, that the statement of Simplicius, as to their early date, is an exaggeration. In these observations, the time is given only in hours and fractions of hours, and the part of the diameter eclipsed within a digit or twelfth part of the moon's diameter; but rough as they are, they are among the earliest trustworthy observations extant; and a comparison of them with modern observations led Hally to the discovery of the fact of the moon's acceleration—that is, that she now moves round the earth with greater velocity than formerly. It is remarkably illustrative of the Chaldæan habit of diligent observation, that the Chaldæans were acquainted with the cycle of 6,585⅓ days, during

which the moon makes about 223 synodical revolutions, and experiences the same number of eclipses, alike, too, in order and magnitude, comparing cycle with cycle. The clepsydra as a clock, the gnomon for determining the solstices, and a hemispherical dial for ascertaining the positions of the sun, were used by the Chaldæans, and they also have the credit of the invention of the zodiac and the duodecimal division of the day.

The Egyptians, it is supposed, were the first instructors of the Greeks in A. They do not, however, appear to have observed much for themselves. The meaning of what data they have left behind them can be guessed at in only a few instances. No mention is made by Ptolemy of the idea ascribed to them, that the planets Mercury and Venus moved round the sun; the probability therefore is, since Ptolemy was not likely to overlook such a novel theory, that they entertained no such notion at the time of his writings, but that it is an after-thought of later ages. From the accuracy with which some of the pyramids face the cardinal points, there is a supposition that they must have been erected for astronomical purposes; but if it be true, as is stated, that Thales taught the Egyptians how to find the height of the pyramids by the shadow, and that the latter informed Herodotus that the sun had twice been seen to rise in the west, the conclusion is that the A. of the ancient Egyptians was very meagre and absurd.

Before this point of history, A. is little else than tradition. The Greeks have the honor of elevating it into the dignity of a science. Thales (B.C. 640), founder of the Ionic school, laid the foundation of Greek A. He it was who first set forth the theory of the earth's sphericity. The sphere he divided into five zones. He predicted the year of a great solar eclipse, but this it is now supposed he must have having no observations of their own to guide them—casually succeeded in doing—the Greeks at this time by means of the Chaldæan Saros, or period of eighteen years and ten days, which gives a regular recurrence of eclipses. He made the Greeks, who, prior to his time, were content to navigate their vessels by the Great Bear—a rough approximation to the north—acquainted with the lesser constellation of that name, a much better guide for the mariner. His system, however, contained much absurdity. Among other things, he held that the stars were composed of fire and that the earth was the centre of the universe. The successors of Thales held opinions which in many respects are wonderfully in accordance with modern ideas. Anaximander, it is said, held that the earth moved about

its own axis, and that the moon's light was reflected from the sun. To him is also attributed, on somewhat slender authority, the belief in the grand idea of the plurality of worlds. Anaxagoras, who transferred the Ionic school from Miletus to Athens, is said to have offered a conjecture that, like the earth, the moon had habitations, hills, and valleys.

Pythagoras (B.C. 500), the next astronomer of eminence, was far in advance of his predecessors. He promulgated, on grounds that were fanciful, the theory, since established, that the sun is the centre of the planetary world, and that the earth circulates round it. Pythagoras also first taught that the morning and evening star were in reality one and the same planet. But the views of Pythagoras met with little or no support from his successors until the time of Copernicus. Between Pythagoras and the advent of the Alexandrian school, nearly a couple of centuries later, the most prominent names in astronomical annals are those of Meton (B.C. 432), who introduced the luni-solar cycle, and in conjunction with Euctemon observed a solstice at Athens, B.C. 424; Callippus (B.C. 330), who improved the Metonic cycle; Eudoxus of Cnidus (B.C. 370), who brought into Greece the year of 365¼ days, and wrote some works on A.; and Nicetas of Syracuse, who is reported to have taught the diurnal motion of the earth on its axis.

To the Alexandrian school, founded by the munificence of the Ptolemies, the world owes the first systematic observations in A. Hitherto the truths of A. rested on no better evidence than the observations of isolated individuals, and these being opposed to the testimony of the senses, met with but little acceptance from the world. The Alexandrian school originated a connected series of observations relative to the constitution of the universe. The positions of the fixed stars were determined, the paths of the planets carefully traced, and the solar and lunar inequalities more accurately ascertained. Angular distances were calculated with instruments suitable for the purpose by trigonometrical methods, and ultimately the school of Alexandria presented to the world the first system of theoretical astronomy that had ever comprehended an entire plan of the celestial motions. The system we know to be false, and inferior to the Pythagorean notions; but it had the merit of being founded upon a long series of observations of phenomena, a principle which finally brought about the reform of the system, while the previous theories were the results of mere hypotheses.

The most interesting points in the early history of the Alexandrian school are the attempts made to de-

termine the distance of the earth from the sun, and the magnitude of the terrestrial globe. Aristarchus of Samos—the pioneer of the Copernican system, as Humboldt calls him—is the author of an ingenious plan to ascertain the former. See ARISTARCHUS OF SAMOS.

Among the eminent members of this school were Timocharis and Aristyllus, who made the observations which, together with observations of Hipparchus (q.v.) enabled the latter to discover the precession of the equinoxes; Eratosthenes (q.v.), the first who attempted to determine on true principles the magnitude of the earth, and to clear, as Humboldt expresses it, 'the description of the earth from its fabulous traditions,' and Autolycus, whose books on A. are the earliest extant in the Greek language.

With Hipparchus of Bithynia (B.C. 160-125), far the greatest name of all in astronomical science down to that period, begins the real written history of scientific A.; for not until his era were there facts verified and sufficient in number on which to build a system. Hipparchus was at once a theorist, a mathematician, and an observer. He catalogued no less than 1,081 stars—the first trustworthy catalogue that we have. He discovered the precession of the equinoxes; he determined, with greater exactitude than his predecessors had done, the mean motion, as well as the inequality of the motion of the sun, also the length of the year. He determined the mean motion of the moon, her eccentricity, the equation of her centre, and the inclination of her orbit; and he suspected the inequality afterwards discovered by Ptolemy (the evection). He invented processes analogous to plane and spherical trigonometry, and was the first to use right ascensions and declinations, which he afterwards abandoned in favor of latitudes and longitudes.

For more than two centuries and a half after the demise of this indefatigable astronomer, no name of note appears, though Sosigines of Alexandria did a most useful service by the wise counsel he gave Cæsar in the reformation of the Calendar. Ptolemy (A.D. 130-150) is the next who rises above the mass of mediocrities. Besides being a practical astronomer, he was accomplished as musician, geographer, and mathematician. His most important discovery in A. was the evection of the moon. He also was the first to point out the effect of refraction. He extended and improved many of the theories of Hipparchus, and was the founder of the system known by his name, universally accepted as the true theory of the universe, until the researches of Copernicus overthrew it. The Ptolemaic system, expounded in the *Great Collection*, or, as it was called by the Arabs, the *Almagest*—from which source most

of the modern knowledge of Greek A. is derived—placed the earth immovable in the centre of the universe, making the entire heavens revolve round it in the course of twenty-four hours.

With Ptolemy closes the originality of the Greek school. His successors were men of no mark, confining themselves for the most part to astrology, or to comments on earlier writers. To the Arabs are due the next advances in A. They commenced making observations A.D. 762, in the reign of the Caliph Al Mansur, who gave great encouragement to science, as did also his successors, the 'good Haroun Alraschid' and Al Mamoum, both of whom were diligent students of A. For four centuries, the Arabs prosecuted the study of the science with assiduity, but they are meritorious chiefly as observers. They had little capacity for speculation, and throughout held the Greek theories in superstitious reverence. They, however, determined with much more accuracy than the Greeks had done the precession of the equinoxes, the obliquity of the ecliptic, and the solar eccentricity; and the length of the tropical year was ascertained within a few seconds of the truth. The most illustrious of the Arabian school were Albategnius or Al Batani (880), who discovered the motion of the solar apogee (see ANOMALISTIC YEAR), and who was also the first to make use of sines and versed sines instead of chords; he corrected the Greek observations, and was altogether the most distinguished observer between Hipparchus and the Copernican era; and Ibn-Yunis (1000) an excellent mathematician, who made observations of great importance in determining the disturbances and eccentricities of Jupiter and Saturn, and who was the first to use cotangents and secants.

In northern Persia, an observatory was erected by a descendant of the renowned warrior Genghis Khan, where some tables were constructed by Nasir-Eddin; and at Sarmacand, Ulugh Beg, a grandson of Timur, made, 1433, many observations, and the most correct catalogue of stars which, down to his time, had been published.

In the 13th c., A. was again introduced into western Europe, the first translation from the *Almagest* being made under the emperor Frederick II. of Germany, abt. 1230; and in 1252 an impulse was given to the science by the formation of astronomical tables under the auspices of Alfonso X. of Castile. An Englishman, named Holywood (Sacrobosco), 1220, wrote a book of great repute in its day on the spheres, chiefly abridged from Ptolemy; and among others who did much to promote a taste for A. were Purbach (1460), Regiomontanus

(John Muller, died 1476), and Waltherus, pupil of the latter, who made numerous observations of merit.

At this point comes into view the illustrious name of Copernicus (1473-1543), to whom was reserved the grand honor and the danger—for there is ever danger in bringing old notions into disrepute by introducing new truth—of disproving the Ptolemaic idea, and of promulgating a correct though imperfect theory of the universe. His system is in some part a revival and systematic application of the opinions said to have been held by Pythagoras. It makes the sun the immovable centre of the universe, around which all the planets revolve in concentric orbits, Mercury and Venus within the earth's orbit, and all the other planets without it. In the Copernican theory, there remained many of the old notions since shown to be fallacious. It is a current belief that Copernicus, afraid to state boldly such heterodox views of the universe as those he entertained, gave them forth in the form of an hypothesis. Humboldt (*Cosmos*, vol. ii. p. 345), denies that he did so. The distinguished authority says: 'The language of Copernicus is powerful and free, and bursts forth from his inmost convictions, and thus sufficiently refutes the ancient opinion, that he has brought forward the system which is immortalized by his name, as a hypothesis made for the convenience of calculating astronomers, or as one which has but a probable foundation.' The same author also refutes the popular notion that Copernicus died a few hours after receiving a printed copy of his book. He was broken down in body and mind when his work *On the Revolutions of the Heavenly Bodies* was brought to him, but he did not die until 'many days afterwards, 1543, May 24.'

Among the contemporaries of Copernicus were Rheinhold, who constructed the Prutenic tables; Recorde, the first to write on A. in English; and Nonius, a Portuguese, who invented a method for dividing the circle. The study of A. was also much aided about this time by the liberality of the Landgrave of Hesse-Cassel, William IV.

Decidedly the most industrious observer and eminent practical astronomer from the time of the Arabs to the latter half of the 16th c. was Tycho Brahé (1546-1601). Considerable odium attaches to him on account of his repudiation of the Copernican system, but it should not be forgotten that in the time of Tycho that system was not supported by the conclusive evidence which now renders it unquestionable. Tycho's system, which made the sun move round the earth, and all the other planets round the sun, they

moving with it round the earth, explained all natural phenomena then observed equally well, while it must have appeared more probable than the crude and, at that era, undemonstrable theories of Copernicus. Tycho Brahé compiled a catalogue of 777 fixed stars, more nearly perfect than any previous attempt. He made the first table of refractions, and discovered the variation and annual equation of the moon, the inequalities of the motion of the nodes, and the inclination of the lunar orbit, and rejected the trepidation of the precession, which had hitherto injuriously affected all tables. He also made some interesting cometary investigations.

To his researches are mainly due the discovery by Kepler (1571-1630) of those famous laws which have rendered his name immortal. See KEPLER. To Kepler is due the credit of divesting the Copernican system of its absurdities. Kepler is also said to have had some notion of the law of gravitation.

Galileo Galilei (1564-1642) first applied to the investigation of the heavens the telescope, which he made from a general description of the instrument of Hans Lipperhey of Holland, first inventor of the telescope. He was rewarded by the discovery of the inequalities on the moon's surface. The important discoveries of the four satellites of Jupiter, the ring of Saturn—not then distinctly recognized as a circle—the spots on the sun, and the crescent form of Venus, followed in quick succession. For propagating the Copernican doctrine of the universe, Galileo incurred the displeasure of the Roman Church, and was compelled by the Inquisition to retract his opinions.

But the eternal laws of nature are not to be suspended by the recantation of a philosopher forced by the tyranny of priestcraft. The earth moved onward round the sun in spite of both; and scientific truth was now too old to remain in the restrictive leading strings of any ecclesiasticism.

The next great epoch in the history of A. brings into view England and Newton (1642-1727). In the interval, practical A. had profited largely by the logarithms of Napier; the mathematical researches of Descartes; the application of the telescope to the quadrant by Gascoigne, an Englishman, and afterwards by Auzout and Picard; by Römer's discovery of the progressive motion, and measurement of the velocity, of light; by the invention of Vernier; and the application of the pendulum to clocks by Huygens, who also brought into use the spiral spring, and made some valuable observations on the ring and satellites of Saturn; as well as by the investigations of Norwood, Horrocks, Hooke, Hevelius, Gilbert, Lebnitz, and Dominicus Cas-

sini, to the last of whom especially the scientific world owes much. Among a variety of valuable observations and discoveries may be mentioned his thorough investigation of the zodiacal light, his determination of the rotations of Jupiter and Mars, and of the motions of Jupiter's satellites from their eclipses, his discovery of the dual character of Saturn's ring; also of four of his satellites. Newton's fame rests upon his discovery of the law of gravitation, upon which the common belief is that he was led to speculate by the fall of an apple. Newton announced his discovery in the *Principia*, 1687, which was briefly that every particle of matter is attracted by, or gravitates to, every other particle of matter, with a force inversely proportioned to the square of their distances. The first gleam of this grand conclusion is said to have so overpowered Newton that he had to suspend his calculations, and to call in a friend to finish the few arithmetical computations that were incomplete. This discovery is perhaps the grandest, certainly the most impressive, recorded effort of human genius. Newton made also the important discovery of the revolution of comets round the sun in conic sections, proved the earth's form to be an oblate spheroid, gave a theory of the moon and tides, invented fluxions, and wrote upon Optics.

While the foundations of physical A. were thus broadly laid by Newton, Flamsteed—the first astronomer royal at Greenwich, to whom, until recently, scant justice has been done—and Halley, were greatly improving and extending the practical department of the science. To the former we are indebted for numerous observations on the fixed stars, on planets, satellites, and comets, and for a catalogue of 2,884 stars. His *Historia Coelestis* formed a new era in sidereal A. Dr. Halley, who succeeded Flamsteed as astronomer royal, discovered the accelerated mean motion of the moon, and certain inequalities in Jupiter and Saturn, but he is most famed for his successful investigations into the motions and nature of comets. His successor was Dr. Bradley, who, in the year of Newton's death, made the important discovery of the aberration of light, which furnishes the only direct and conclusive proof we have of the earth's annual motion. To him also we are indebted for our knowledge of the nutation of the earth's axis. He was, besides, an unwearied observer, and left behind him at his death upwards of 60,000 observations. Altogether, Bradley's is deservedly one of the most honored names in modern A. Dr. Maskelyne, who was appointed to the observatory after Bradley, originated the *Nautical Almanac*.

ASTRONOMERS.

1. Copernicus.
2. Ptolemy.
3. Galileo Galilei.
4. Sir Isaac Newton.
5. Sir John Herschel.
6. Tycho Brahe.
7. Pierre Simon LaPlace
8. Johann Kepler.

Merely to mention the names of men who from the death of Bradley to the present time have added, by theory and observation, to the knowledge of A., would extend this synopsis much beyond due limit. The 18th c., which opened with lustre derived from the physical demonstrations of Newton, closed magnificently with the telescopic discoveries of Sir William Herschel, who added to our universe a primary planet (Uranus) with its satellites, gave two more satellites to Saturn, resolved the milky-way into countless myriads of stars, and unravelled the mystery of nebulæ and of double and triple stars. Laland, Lagrange, Lacaille, and Delambre, in the latter half of the 18th c., did much by their researches and analyses to systematize and improve the science of A. The instrumental means of observation were also, during that time, brought to high perfection. Laplace, in his great work the *Mécanique Céleste* (1799-1808), gave what further proof was needed of the truth and sufficiency of the Newtonian theory.

The 19th c. opened with the discovery of the four small planets—Ceres (1801), by Piazzi; Pallas (1802), and Vesta (1807) by Olbers; and Juno, by Harding, 1804. In 1845, Hencke discovered the fifth of this group revolving between Mars and Jupiter, to which the name of Astræa was given; and by the end of 1900 over 500 planetoids (q.v.) had been discovered. The greatest events of the century have been the discovery of the planet Neptune 1846, and the photographing of the heavens.

Observations upon Uranus had shown the motions of that planet to present great irregularities, which could not be explained by the action of Jupiter and Saturn; and after carefully examining the analytical theory of Uranus, Leverrier, a young academician of France, in the summer of 1846, published the elements of an undiscovered planet, the cause of the perturbations. He boldly declared its existence, calculated its mass, and referred to its place in the heavens; and scarcely a month afterwards, Sep. 23, the hitherto concealed object (Neptune) was found by M. Galle of Berlin. It was only by accident that France has the honor of this remarkable achievement. Mr. Adams of Cambridge, Eng., had arrived at results nearly as perfect as those of Leverrier, and had communicated them to Mr. Challis, professor of A. at Cambridge, 1845, Sep., a year before the discovery of the planet, and nearly a year before the publication of Leverrier's final calculations. Mr. Challis, it appears, commenced a search for the planet, July 29; and, Aug. 4 and 12, he actually seized the planet, and recorded two positions of it, but did not recognize it, through not comparing his

observations, which a pressure of occupation, and an impression that the discovery required a much more extensive search, prevented. But for this, and the non-publication of the Cambridge mathematician's results at the time they were forwarded to Sir George Airy, 1845, Oct., the honorable position of M. Leverrier would have been occupied by Mr. Adams, and that of M. Galle by Mr. Challis.

Among the astronomical phenomena that in the 19th c. have engaged the attention of astronomers, the spots on the sun hold a chief place. Galileo, as we have seen, discerned these spots, but the credit of having been the first to notice them is in dispute between him and four of his contemporaries. Systematic and continuous observation of sun spots were made by Schwabe of Dessau during 46 yrs., 1826-72. The periodicity of the phenomena was soon discovered by Schwabe: he found that the spots wax and wane in frequency in a period of about 11 years. The tables prepared by Schwabe suggested to others a relation between sun spots and magnetic disturbances—a fact simultaneously noted by several physicists. A relation was also discovered to exist between the sun spot period and auroral phenomena. Prof. Loomis of Yale College found that the auroral maximum generally occurs a little later than the magnetic maximum. He infers that a sun spot is a result of a disturbance of the sun's surface, which is accompanied by an emanation of some influence from the sun, which is almost instantly felt upon the earth in an unusual disturbance of the earth's magnetism, and a flow of electricity, developing the auroral light in the upper regions of the earth's atmosphere.—Spectrum analysis has in our day yielded results unimaginable to astronomers of an earlier period. When the telescope brought within the reach of vision celestial objects not discernible by the unaided eye, it might well have been believed that in the development of that instrument, and there alone, lay the hope of enlarging man's knowledge of the starry heavens. But the spectroscope analyzes the physical constitution of the most distant orbs, determining their chemical composition, or at least giving evidence of the presence in them or the lack of elements found in our own globe. So, too, the spectroscope pronounces infallibly on the state, whether solid, liquid, vaporous, or gaseous, of distant bodies. The improved methods of analysis and the marvellous advance in the construction of optical and other philosophical instruments, have enabled astronomers to attack the problems of binary or of multiple stars, and to decide whether such groups form systems revolving about one another

or around a common centre; of variable stars; the proper motions of stars; the translation of the solar system in space; the constitution of the nebulæ; the nature of the sun's spots and faculæ; the phenomena presented by the solar envelope in eclipses; and the like.—Dr. John William Draper of New York was a pioneer in astronomical photography. His first success was had in obtaining a distinct photograph of the fixed lines in the solar spectrum; he next photographed the moon, 1840. Draper's photograph of the moon was without a parallel till 1889, when, by the aid of the large instrument of the Lick Observatory, Mt. Hamilton, Cal., an image of our satellite, having a diameter of 5 in., was obtained. But in 1890 the two brothers Paul and Prosper Henry of Paris, instead of receiving the image of the moon direct from the telescope on a photographic plate, made it first traverse another lens, which magnified it to 15 diameters; this magnified image was then photographed in sections. Dr. Henry Draper, son of John William D., photographed the great nebula in the constellation Orion, 1880. Three years later the same nebula was photographed with the most brilliant success by Dr. Commons of Ealing, Eng. Photography has materially helped to solve many problems regarding the constitution of the sun.—As early as 1860 Lewis M. Rutherford of New York recognized the great service that might be rendered by photography in constructing maps of the stars, but the suggestion was for a time resultless, and was not acted on till 1882 (and then not intentionally), when Dr. David Gill of the Cape Observatory made his celebrated photograph of the greater comet of that year. The photograph showed distinctly a number of stars down to the 9th magnitude. Two years later stars down to the 16th magnitude were photographed by the brothers Henry of Paris; their photograph of the Pleiades showed 1,421 stars in the neighborhood of that constellation; it also showed a nebula surrounding one of the principal stars, though no nebula had ever been detected by the eye, even when assisted by the most powerful optical instruments. N. B. Wolf of the Paris Observatory had then devoted the whole of 3 years to preparing a chart of the stars in Pleiades, but had catalogued no more than 671 stars. The photograph, exhibiting with the most unimpeachable accuracy 1,421 stars, was the work of three hours. With instruments of still greater precision and delicacy, other photographs have been obtained which show that the constellation Pleiades presents an almost continuous field of nebulous matter. The value of Prof. Rutherfurd's suggestion was thus demonstrated and a stellar map of the whole heavens was projected. An international congress of astronomers was

called to meet in Paris 1887 to consider ways and means of executing the project. The congress appointed a commission to procure the construction of a photographic stellar map. The work of constructing the map was allocated in sections to the astronomers of different countries. Each section photograph is to represent the stars in an area of 4 sq. degrees. Before the map is completed no less than 22,000 plates will have been exposed to the sky, each for about an hour. Since 1883 Dr. Edward C. Pickering of the Harvard College Observatory has been engaged in the work of determining the light and color of stars by photography. Photography was first employed in observing a solar eclipse 1869, and by its aid it was proved beyond question that the corona is a solar, not a terrestrial phenomenon.—As a means of determining the proper motion of stars spectroscopic analysis has proved to be of great service. If a star is receding from the point where the observer stands, the wave-length of any portion of its light must be apparently lengthened; if it is approaching, the wave-length must be shortened. The English astronomer Huggins has in this way recognized in some of the brighter stars motions of recession or approach amounting in some cases to 30 or 40 miles per second.—Since the opposition of Mars (1877) that planet has been an object of special study. At that opposition Prof. Asaph Hall of Washington discovered the two pygmy moons of Mars, and Prof. Schiaparelli of Milan began that series of studies of the planet's surface which led to his discovery that Mars is covered in its equatorial and temperate zones with a network of straight dark lines which he calls 'canals.'

At the present time A. is divided up into a number of special branches, and few professional astronomers attempt to cultivate more than one of these branches at a time, though several of them may be successfully investigated by one individual in the course of a life time. We shall mention briefly some of the most important lines of astronomical research.

(1) *Mathematical Theory of the Heavenly Motions.*—This branch of the Science is almost entirely mathematical, and consists in the development of the Newtonian law of attraction. It may be applied to existing bodies with a view of forming tables, or to purely ideal systems of 3 or more bodies. The problem of 3 bodies in its general form is insoluble, but various approximate solutions under limited conditions have been obtained. This line of research leads to the general subject of Periodic orbits, which has grown out of Dr. G. W. Hill's famous paper on the motion of the Lunar perigee published in 1877. The great French mathematician Poincaré has developed Hill's idea of periodic orbits, and given a magnificent extension of the subject in his new work on

Celestial Mechanics. An important study has also been made of the limits of stability of certain classes of these orbits by Sir George Darwin of Cambridge, Eng. The list of eminent investigators in this field includes Gylden, Tisserand, Callandreau, Weiler, and various continental mathematicians. Something has also been done in America by Lovett of Princeton, and Moulton of Chicago. A great improvement on Gauss' method of determining orbits has recently been invented by Leuschner of the University of California. Among those who have labored to impove the tables of the Planets, Hill and Newcomb stand pre-eminent. The Lunar Theory is now being perfected by Brown of Haverford, and Cowell of Greenwich, both of whom base their work on the newer methods developed since the publication of Dr. Hill's famous paper of 1877.

(2) *Meridian Circle Observations.*—Observations with the Meridian Circle give the places of the fixed stars, and also of the Sun, Moon, and planets, which may be referred to the fixed stars or observed absolutely. The theories of the motions of the planets are based chiefly on meridian observations.

(3) *Observations with the equatorial telescope.*—This work covers a wide field, and a variety of subjects: satellites, double stars, comets, planets, etc., and the investigations include the orbits of satellites, double stars, and comets. The most important workers of late years have been the following: (1) On satellites, Hall, Struve, See, Barnard, Aitkin and Perrine, who discovered the 6th and 7th satellites of Jupiter in 1905. (2) On double stars, Burnham, Hough, See, Hussey, Aitken, Doolittle, all Americans.

(3) On comets, Barnard, Perrine, and Brooks, are noted observers; and Poor, Leuschner, Schulhof and Bauschinger investigators of orbits. (4) On the diameters and physical aspects of the planets important investigations have been made by Barnard, Struve, See, Lowell, Campbell, Hussey, and W. H. Pickering.

The equatorial telescope is applied to the measurement of all kinds of objects, within the Solar System, and among the fixed stars, and many observers are occupied with this kind of work at all the large observatories. To get the finest results a clear and steady atmosphere is quite as essential as a good instrument, and recently a movement has been started for placing large telescopes in localities where they can perform to best advantage.

(4) *Observations of the Sun.*—This work is now carried on almost entirely by photography. The principal solar observatories are the following: Potsdam, Rome, Meudon, Greenwich, Washington, Yerkes, and Carnegie Solar Observatory, Mt. Wilson, California. Not

only the spots and prominences are recorded, but also the faculæ and floculi, which are taken by means of the spectroheliograph. In this line the most important workers of late years have been: Vogel, Tacchini, Huggins, Lockyer, Janssen, Delandres, Young, Langley, Frost, Hale, and Adams. The most important mathematical investigations on the internal constitution of the sun have been those made by Helmholtz, Lane, and See.

(5) *Investigations of Spectra by means of Photography.*—This work has now attained great accuracy, and is used for a great variety of purposes. At the Lick Observatory extensive observations are being made on the stars of both hemispheres to get the motion in the line of sight, so as to determine the direction of the motion of the Solar System in space. Sir William Huggins is the founder of this branch of Science. It has also been much cultivated by Professors Vogel at Potsdam, Frost at Yerkes, Campbell at Lick, and Pickering at Harvard.

(6) *Astronomical Photography.*—This useful aid to investigation is now applied to all kinds of observations. The photographs, however, only record the phenomena, and have to be afterwards measured and reduced, which is often a most laborious process. By means of the large endowments left to Harvard College Observatory, Prof. Pickering has taken an incredible number of photographic plates, which are stored away like books in a library. The principal discoveries so far have been a large number of variable stars, discovered chiefly by Prof. Solon I. Bailey, and two new satellites of Saturn, discovered by Prof. W. H. Pickering. From the Draper photographs of stellar spectra Mrs. Fleming has found also a number of variable stars, and ascertained the spectral class to which many thousands of the stars belong.

(7) *Physical Constitution of the Heavenly Bodies.*—The spectroscope tells us something of the outside layers of cosmical masses, but gives us no light on the laws of internal density, temperature, pressure or rigidity. We must therefore determine the laws of the internal constitution from the theory of gravity and the mechanical theory of gases. Lane first began the work on the constitution of the sun in 1869, and established very important principles. The subject has since been extended by Ritter, Lord Kelvin, Perry, and See. Considering the sun and stars to be at such high temperature that the gases are monatomic, Professor See has revived and greatly extended the work of Lane, and in fact developed a very perfect mathematical theory of the physical constitution of the heavenly bodies. Only three results can be mentioned here. (1) The central density of a monatomic star is exactly six times the mean density. (2) Over one-half of the total heat of condensation from the

creation is stored up in the stars; this storage of heat is the cause of their luminosity and will make their future activity three times that of the past. (3) The surface layers are shown to be so rare that no doubt can remain that the supply of light and heat is furnished by direct radiation rather than by convection currents as was formerly supposed. In fact Dr. See's researches show that no circulation at great depths is possible in large masses, on account of the pressure, which gives the under layers a high effective rigidity. In one of his latest investigations he determines from the theory of gravity alone the rigidity of the earth, sun and all the planets. In the case of the earth he finds the rigidity nearly equal to that of nickel steel, in close accord with the earlier work of Lord Kelvin and Sir George Darwin. Venus is found to have a rigidity about equal to that of platinum or wrought iron; Mars has a rigidity equal to that of gold, and Mercury about equal to that of glass. The major planets, owing to the great pressure operating throughout their masses, have average rigidities between 3 and 18 times that of nickel steel. The average rigidity of the sun is found to be over 2,000 that of nickel steel. This great effective rigidity of the sun's interior shows that currents cannot descend in the sun to any appreciable depth. It is truly remarkable how much light can be thrown upon the interior of the heavenly bodies by the simple law of Newton and the mechanical theory of gases. Some of the laws of Physics deduced originally from experiments in the laboratory are thus extended to all the bodies observed in the sidereal universe. See also the following:

ACCELERATION, ALTAZIMUTH, APHELION, APSIS, ASCENSION, RIGHT, CONSTELLATION, COPERNICAN SYSTEM, CYCLE, DAY, EARTH, ECLIPTIC, ELEMENTS, EQUATORIAL, EQUINOXES, GALAXY, GRAVITATION, HARVEST MOON, HORIZON, KEPLER'S LAWS, LAT. AND LONG., LUNAR THEORY, MERIDIAN, MURAL CIRCLE, NODES, NOTATION, OBSERVATORY, OCCULTATION, ORBIT, ORRERY, PENUMBRA, PERIGEE, PERIHELION, PERIOD, PERTURBATION, PHASES, PHOTOGRAPHY CELESTIAL, PTOLEMAIC SYSTEM, SATELLITES, SEASONS, SOLSTICE, TWILIGHT, YEAR, ZODIAC, ETC.

AS'TUR: see FALCONIDAE: GOSHAWK.

ASTURIAS, *âs-tô'rē-âs* (now OVIEDO, *ō-vē ā' dō*): a northern province of Spain; bounded e. by Santander, s. by Leon, w. by Galicia, n. by the Bay of Biscay. The low hills of Leon and Old Castile rise gradually to the mountain-chain which forms the s. boundary, and towers to about 11,000 ft. in the summit *Pena-de-Penaranda*. The main road from Leon to Oviedo passes over the mountain-chain at Pajares. The n. slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain.

ASYLUM, n. *ă-sī′lŭm*, Asy′lums, n. plu. [L. *asy′lum*—from Gr. *as′ulon*—from Gr. *a*, not; *sulăō*, I rob or plunder: It. *asilo:* F. *asile*]: a place out of which he that has fled to it may not be taken or robbed; a place of refuge; a sanctuary; a hospital for the insane.—Syn.: a refuge; sanctuary; shelter; retreat. In ancient times, sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals, as well as persecuted persons, might flee for refuge; and to molest them in such places was regarded as an impiety. An analogous institution is found in the laws of the Jews, Num. xxxv., where six 'cities of refuge' are appointed for persons guilty of manslaughter. Among the Greeks in early times, these asylums may have been sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Minerva, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the A. by fire or starvation. In Rome, the emperor Tiberius abolished all such places of refuge from law, excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples, was adopted also by the ancient Christian Church. In the time of Constantine the Great, the churches were made asylums; and Theodosius II. extended the privilege to all courts, alleys, gardens, and houses belonging to the church. In 681, the synod of Toledo extended the privilege of A. to a space of 30 paces around every church. In the lawless periods of the middle ages, the influence of the church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals; and this led to several modifications which gradually destroyed the privilege of Sanctuary (q.v.). In England, it was abolished by acts passed 1534 and 1697. The word A. is now applied to places of shelter for unfortunate or destitute persons, and to hospitals for the blind, the deaf and dumb, and especially for the insane. See Lunacy. Asylum, Right of, an international law, which forbids one government to apply its laws to its own or its enemy's subjects when within the jurisdiction of another government.

ASYMPTOTE, n. *ăs′ĭm-tōt* [Gr. *asŭmptōtus*, not falling together—from *a*, not; *sun*, together; *ptōtos*, apt to fall]: a line that approaches nearer and nearer to some curve without ever meeting it. An example of an A. will be seen under Hyperbola. Asymptotic, a. *ăs-ĭm-tŏt′ĭk*, or Asymptot′ical, a. [Eng. *asymptote:* F. *asymptotique*]: pertaining or relating to an asymptote; perpetually approaching anything, but never meeting it.

ATACAMITE, n. *a-tăk′a-mīt:* a native ore of copper, called also copper-sand; abundant in some parts of S. America, as in the desert of *Atac′ama* between Chili and Peru, from which it derives its name.

It has been incorrectly described as a chloride of copper; and sometimes as a hydrochlorate (muriate) of copper; it is to be regarded rather as a hydrated cupric oxychloride, $CuCl_2 3CuH_2O_2$. It is a rich and productive ore, containing about 55 or 60 per cent. of copper. The percentage composition of various specimens of A. is as follows:

	Copper Protoxide.	Muriatic Acid.	Water.	Total.
Compact atacamite	72.0	16.3	11.7	100
"	76.5	11.0	12.5	100
Sandy ataeamite	70.5	11.5	18.0	100
Crystallized atacamite	73.0	16.2	10.8	100

A. forms often on the surface of copper exposed to the air or sea-water; and the greenish inerustation observed on antique bronze utensils, weapons, and other articles, and commonly known as the *ærugo nobilis*, is composed of this salt. On some antique bronzes from Egypt the A. is erystalline. A. is worked in South Amcrica as an ore of copper; and considerable quantities are sent to England to have the metal extracted therefrom. See COPPER.

ATAGAS, n. *ât'a-găs:* a gallinaceous bird, the red cock.

ATAGHAN, n. *ât'a-găn*, or YAT'AGHAN [Fr. *yataghan*—from Turk. *yatagân*]: a long dagger worn with pistols in the belt, in a metal scabbard, generally of silver, and among the wealthier gilt, or of gold.

ATAHUALPA, *â-tâ-hwâl'pâ:* d. 1533: favorite son of Huayna Capae, Inca of Peru (d. 1525). The father's death was about seven years before Pizarro's arrival in Peru. The mother of A. not being of the pure Inca blood, her son was formerly excluded from inheriting the throne; but his handsome figure, bold spirit, and quick intelligence so won upon the affections of his father, that on his deathbed he declared it to be his will that A. should rceive as his portion the ancient kingdom of Quito (recently conquered), while Huascar, his eldest son, should possess Peru. For five years the brothers lived on terms of real or apparent friendship; but at length the restless ambition of A., who was constantly aspiring to new conquests, excited the uneasiness of Huascar, who, in an evil hour, was induced to send an cnvoy to his brother, with instructions to require him to render homage for his kingdom of Quito. A. fired at the proposal, and war was instantly declared. Placing himself at the head of the army of veterans which his father had left him, he invaded Peru, and in the spring of 1532 completely defeated Huascar on the plains of Quipaypan, in the neighborhood of Cuzco, the nativc Peruvian metropolis, only a few months before the arrival of the Spaniards. Huascar was taken prisoner and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all in whose vcins ran the blood of the Incas; but his statements are so monstrous, and have so little congruity, that they are rejected by Prescott as intrinsically incredible. In the meantime, the Spaniards had disembarked at Tumbez; and after a long, brave, and perilous march through

the unknown country, Pizarro, at the head of his two hundred cavaliers, approached the victorious camp of A., where he found some fifty thousand men assembled. By a daring but diabolical stratagem, Pizarro obtained possession of the person of the king, who had come to visit him in a friendly spirit. While a priest was explaining the Christian religion, and the power of the pope over all the kingdoms of the earth, and how the pope had presented Peru to the Spanish monarch, in whose name they had come, A., indignantly interrupting him, told him that the pope (whoever he was) must be a crazy fool to talk of giving away countries which were not his own. When he inquired on what authority such claims were made, the priest pointed to the Bible, on which A. dashed the book on the ground, and the fields began to fill with Indians. The moment was critical. The crime which Pizarro had resolved upon the night before must be executed then or never. He waved a white scarf, which was the signal agreed upon. The mysterious artillery poured sudden death into the terrified masses of Peruvians, while the Spanish cavalry rode them down with merciless fury. Confusion seized the natives; they submitted—being unarmed—to this terrible butchery, only anxious to save their sacred Inca; but all their efforts to accomplish this proved unavailing, and after exhausting hours in the miserable work of murder, the inhuman Spaniards succeeded in capturing him. A. was treated with a great show of kindness at first, and more especially when he offered as a ransom, 'not merely to cover the floor, but to fill the room in which he stood with gold as high as he could reach.' When A.'s brother, Huascar, who was still a prisoner, heard of this, he offered still more advantageous terms for himself. To prevent this, A. had him secretly assassinated. The golden treasure which was to constitute the ransom of A. now began to pour in, and at length A. demanded his freedom. This Pizarro refused to grant, and accused A. of plotting against him. The result, after much base treachery on the part of the Spaniard, was a mock trial, in which A. was condemned to be burned; he was led to the stake, 1533, Aug. 29: but on agreeing to be 'baptized' his sentence was commuted to death by strangulation.

ATALANTA, *ăt-a-lăn'ta:* a mythical personage, daughter of Iasus and Clymene; b. in Arcadia; celebrated as a huntress, skilled in the use of the bow and arrow. Her father, who had wished a son, exposed her, while an infant, on Mount Parthenios, where she was found near the entrance of a cave by hunters, who brought her up, and afterwards restored her to her parents. While living as a wild mountain-maiden, she slew the centaurs Rhœcus and Hylæus. Afterwards she sailed with the Argonauts (q.v.) to Colchis, and was prominent in the chase of the Calydonian boar (q.v.). She had many suitors, but was merciless in the conditions which she imposed on them. Being the swiftest of mortals, she offered to become the wife of him that should outstrip her—the penalty of defeat being death. At length she was conquered by a trick of one Meilanion,

whom she was compelled to marry. He obtained from Venus a gift of three golden apples, which he successively dropped in the race; and A. was so charmed by their beauty, that she could not refrain from stooping to gather them, and so lost.—Mention is made of another A. in Greek antiquity, to whom a different parentage is assigned, but regarding whom the myth is essentially the same.

ATALIK-GHAZEE, n. *â-tâl'ĭk-gâ'zē* [Hind, *atalik* a private tutor, a preceptor: Arab., Hind. *ghazi*, a Mohammedan hero, especially if victorious in the battle against the 'infidel']: title given to the ruler of eastern Turkestan.

ATARAIPU, *â-tâ-rī-pô'* [signifying *Devil's Rock*]: a singular eminence in British Guiana, a granite pyramid, which arises abruptly from the plain abt. 900 ft., wooded for rather more than one-third of the height, but bare thence to the peaked summit.

ATAVISM, n. *ăt'a-vĭzm* [L. *atăvus*, an ancestor—from *avus*, a grandfather]: the reappearance of any peculiarity of a family in a generation, after a period of latency; in *zool.*, the tendency of species or varieties to revert to an original type. Darwin used the term *reversion to type* as almost a synonym for Atavism.

ATAXIC, a. *ă-tăk-sĭk*, or ATACTIC, a. *ă-tăk'tĭk* [Gr. *a*, without; *taxis*, order—from *tasso*, I put in order]: wanting order; irregular. ATAXIA, n. *ă-tăk'sĭ-a*, irregularity; want of co-ordination in the movements of a limb or organ.

ATBARA, or BAHR-EL-ASWAD: see NILE.

ATCHAFALAYA, *ăch-af-a-lī'a:* a branch of the Mississippi at its delta. It forms so large an angle with the main river, that, after a course of only 130 m., it enters the Gulf of Mexico, 120 m. to the w. of New Orleans. From the Red river, which enters the Mississippi just above its own point of departure, the A. had received so much drift-wood, that some years since a stationary raft had been formed, 10 m. long, 220 yds. broad, and 18 ft. deep—an obstacle to navigation which the state of Louisiana required four years to remove.

ATCHEEN, *ăt-chēn':* till 1873 an independent kingdom forming the n.w. part of Sumatra; 20,471 sq. m. The interior is mountainous, Abong Abong attaining a height of 10,988 ft. The natives are well made, industrious, intelligent, but treacherous. In 1873, the Dutch declared war, and, though at first repulsed, by 1879 had wholly conquered the country. The people barter for opium with Penang and Singapore, pepper, edible nests, gold-dust, camphor, benzoin, sulphur, satin-wood, betel nuts, etc. Pop. 111,000.

A., the cap., lies on both sides of the river, 5° 35′ n. lat., 95° 26′ e. long.; in a large valley formed by ranges of hills, of which the Golden Mountain is the highest. Pop. 36,000.

ATCHESON, n. *ăt'chĕ-son*, or ATCHISON, n. *ăt'chĭ-son* [named after Mr. Atkinson (or the Scotch pronunciation

Atcheson), an Englishman who was assay-master of the mint at Edinburgh in the beginning of James VI.'s reign]: a copper coin, washed with silver, struck in the reign of James VI.: value, eight pennies Scotch, or 2-3 of an English penny.

ATCHEVE'MENT: term nearly equivalent to armorial bearings and often used of a funeral escutcheon. See HATCHMENT.

ATCHISON, *ăch'ĭ-sŭn:* city in Kansas, cap. of Atchison co., pleasantly situated on the right bank of the Missouri river at the extreme point of the 'Great Bend' of that stream. It is abt. 30 m. above Leavenworth, the e. terminus of the A. & N. railroad and of the Central Branch of the Union Pacific railroad, the w. terminus of the Missouri Pacific railroad, the n. w. terminus of a branch of the Chicago, Rock Island & Pacific railroad, and the e. terminus of the Atchison, Topeka & Santa Fé railroad. It is a very important railroad centre; on the 8 roads which meet here 90 or more trains arrive and depart daily. It has large and varied industries, particularly in flour mills, machine shops, engine works, and furniture and carriage factories. Its commerce is extensive and rapidly growing. The exports include grain, flour, live-stock, and dressed meats. There are gas, electric light and electric railway plants; several public parks; national and state banks; and daily, weekly, and monthly periodicals. A. is the seat of the State Soldiers' Orphans' Home, of Midland College (Lutheran) and of St. Benedict's College (Rom. Cath.); there is a public library and excellent public high and graded schools, and a number of private secondary schools, of high rank. A fine iron bridge crosses the Missouri river, connecting the city with the railroad lines that terminate on its e. bank. Pop. (1910) 16,429.

ATELES, *ăt'ĕ-lēs* [Gr. incomplete]: genus of American monkeys, of the division with long prehensile tails, to which the name Sapajou (q.v.) is sometimes collectively applied. In the genus A., the head is round, and the facial angle about 60°; the limbs are remarkably long and slender, upon which account the English name Spider Monkey (q.v.) is sometimes used as a generic designation; and the forelimbs are either entirely destitute of a thumb, or have a mere rudimentary one, a peculiarity in allusion to which the name A. was given. The name Coaita or Quata is frequently given to some of the species of A., but is sometimes limited to *A. Paniscus*, as Spider Monkey sometimes is to *A. arachnoides*. One of the best-known species is the Marimonda (*A. Belzebub*), a common monkey of Guiana, immensely numerous on the banks of the Orinoco.

ATELESTITE, n. *ă-tĕl'ĕs-tīt* [Gr. *ateles*, incomplete]: so spelled in Dana's System, 1892—formerly ATELESITE, and then classed under Eulytine, a bismuth silicate: a rare yellow mineral, bismuth arsenate. ATELITE is a copper chloride, volcanic.

ATELIER, n. *ăt-ėl-yā* [F.]: the workroom of a painter or sculptor—called also a 'studio.'

ATELIERS NATIONAUX, *ăt-ėl-yā nă-sĭ-ŏ-nō*, or NATIONAL WORKSHIPS: establishments for governmental provision of work, and organizing of labor; notable in connection with the French revolution of 1848. Immediately after the downfall of Louis Philippe, and the formation of the provisional govt., 1848, Feb., a permanent dept. was established, called *The Committee of the Government for the Workmen*, acting on the doctrine that all workmen were entitled to a living provided for them on a certain uniform scale. While private employment was not forcibly abolished, inducements were held out which made workmen leave and employers break up the existing establishments. Consequently, nearly all the Parisian workmen threw themselves on the govt., and others flocked in, in great numbers. The men were organized under lieutenants and brigadiers of their election. They were employed on roads, railways, earthworks, etc., but it was impossible to find work for the whole, and a great part of the labor was unprofitable. There were also 30,000 to 40,000 women employed in preparing articles of outfit for the workmen, whose work left only a trifling loss. In June, when the number of men dependent on the govt. had increased to 130,000, the Constituent Assembly resolved upon the immediate closing of the A.N. As a result the discontent fermenting in Paris was kindled into the armed insurrection put down by the national forces under Cavaignac, only after the terrible fighting of the *Days of June*.

ATELLANÆ, *a-tĕl-lā'nē*, *Fabulæ Atellanæ* (also styled *Ludi Osci*): a kind of popular drama in Rome produced from Atella, a town in Campania, between Capua and Naples. After the Greek drama had heen brought to Rome by Livius Andronicus, the old *Fabulæ Atellanæ* were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama although their character was to some extent the same. In the latter, satyrs figured; while the former personated real Oscan characters. The *Maccus* and *Bucco* of the *Fabulæ Atellanæ* may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. The A. were neither so dignified as the *comoedia praetextata*, nor so low as the *comoedia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and though quizzical, it did not lapse into obscenity, like the *mimi*.

A TEMPO, ad. *ă-tĕm'pō* [It. in time]: in *music*, used to indicate that the interrupted time is to be restored.

A TEMPO GIUSTO, *â-tĕm'pō jôs'tō* [It., in correct time]: in *mus.*, used to denote that, after a recitative, the performer should keep the music true and correct, which, during the recitative, had been altered to suit the action and passion of the scene.

ATESHGA, *â'tėsh-gâ'* [the Place of Fire]: a spot on the peninsula of Apsheron, on the w. coast of the Caspian Sea. It is considered sacred by the Guebres, or Persian Fire-worshippers, who visit it in large numbers. It is about a mile in diameter, and from its centre, in clear dry weather, creeps forth a blue flame (caused by the ignition of the naphtha), which shines with great brightness by night.

ATH, or AATH, *ât:* strongly fortified town in the province of Hainault, Belgium; on the Dender; lat. 50° 36′ n., long. 3° 46′ e. It has an arsenal, hospital, and college, and important manufactures of linen, calicoes, lace, gloves, cutlery, large hammers, etc., and carries on a brisk trade. The ancient church of St. Julien in A. is noted for its extraordinarily high tower. The town has been several times besieged and taken; in 1697, by Catinat and Vauban; in 1706, by the allied forces under the Dutch general Owerkerke; in 1745, by the French after a short siege; and in 1792, by the forces of the Republic under Berneron. Pop. about 11,100.

ATHABASCA, *ăth'a-băs'ka:* river and lake in the n.w. of N. America, forming part of the great basin of the Mackenzie; therefore, in the Northwest Territory of the Canadian Dominion. The *river* rises in the Rocky Mts. near Mount Brown, the highest point in the range. Its actual source is the small lake (see under AMERICA), known as the Committee's Punch Bowl, which sends its tribute at once through the A. to the Frozen Ocean, and through the Columbia to the Pacific. Its general course is n.e., till after passing through A. lake, or rather crossings its w. end, it turns towards the n. w., and, after a course of 30 or 40 m., unites with the Peace river, from beyond the Rocky Mts., to form the Slave river, which, again, after passing through Great Slave Lake, takes the name of the Mackenzie.—*Lake* A. receives nearly all its waters from the A. river, and is noticeable for the fact that its principal feeder traverses not its length but its breadth, and that not in its middle, but at its extremity. The lake's single outlet is the river A.

ATHABAS'CA: a former division of the Canadian northwest formed 1882, and enlarged 1895; 251,965 sq. miles. In 1905, Sept. 1, the province was divided, the westerly portion united to Alberta and the easterly combined with Assiniboia and united to Saskatchewan.

ATHALIA, n. *a-thā'lĭ-a* [Gr. *athates*, not verdant, withered]: genus of saw-flies, *tenthredinidæ*. *A. spinarum* or *centifolæ* is the Turnip Saw-fly, so called because its larvæ, which are the animals called *blacks* or *niggers*, feed on turnips. The perfect insect is common in some years from May to August. It has a black head, a red thorax, with two large and several smaller spots on the back, and an orange-colored abdomen.

ATHALI'AH: daughter of Ahab, King of Israel, married Jehoram, King of Judah, who died B.C. 885. After the death of her son Ahaziah, who succeeded him, but reigned

for only one year, she paved her own way to the throne by putting to death (as she supposed) all the seed-royal. 'But Jehosheba, the daughter of king Jehoram, sister of Ahaziah, took Joash, the son of Ahaziah, and stole him from among the king's sons, who were slain.' The young prince thus rescued was privately educated in the temple and, after A. had reigned six years, the high-priest Jehoiada placed Joash on the throne (B.C. 878). A., hearing the noise attending the coronation, hastened to the temple, where the people were shouting, 'God save the king.' As she looked round in astonishment on the young king, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she 'rent her clothes, and cried, "Treason, treason." ' By the command of the high-priest, she was led out of the temple, and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (2 Kings xi.; 2 Chron. xxi. 6; xxii 10–12; xxiii.) is the subjects of Racine's drama, *Athalie.*

ATHANARIC, *a-thăn'a-rĭk:* King of the Western Goths (d. 381), whose settlements lay on the n. bank of the lower Danube. Because he had taken advantage of the weakness of the Roman empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the emperor Valens. A. acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (369), he hazarded a general battle, and was defeated, whereupon he sued for peace, and with that object had a conference with Valens in a boat on the Danube. Peace was concluded, and A. had his attention occupied in settling dissensions arising out of the Arian controversy which then agitated his people, when the first advance of the Huns on Europe alarmed the Gothic nation. A. attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 374, the Western Goths were received by the Romans as allies, and had settlements granted them on the s. of the Danube, A., with a part of his people, refused to accompany them, removing to the w., and fortifying himself against the new enemy. In 380, however, he was obliged to retire, when he accepted the hospitality of the empire and removed to Constantinople, where he was cordially and honorably received by the emperor Theodosius. At this time died Fritigern, King of the Goths, that had settled on the s. of the Danube; and A, being made king of the whole western Gothic nation, concluded a treaty of peace, in behalf of the whole, which had the effect of incorporating that people with the other subjects of the empire. He died at Constantinople.

ATHANASIAN, a. *ăth'a-nā'zhăn:* pertaining to Athanasius, a bishop of Alexandria in the fourth century, or to the creed called by his name. ATHANA'SIAN CREED: third of the three ecumenical symbols, named from its composi-

tion being attributed to Athanasius; it is also known, from its initial words in Latin, as the creed *Quicunque Vult.* The first part of this creed contains a detailed exposition of the Trinity; the second, the doctrine of the incarnation. Modern criticism has called in question the title of Athanasius to be considered the author of this creed. It was known as early as the beginning of the 6th c., but not under its present name. It is spoken of as 'Athanasius's Tract on the Trinity,' in some Articles of the middle of the 8th c., and is supposed to be alluded to, 'as the Faith of the holy prelate Athanasius,' in the council of Autun, about 670. Athanasius himself makes no mention of this creed, although its doctrines are essentially his; nor do any of the church fathers. Other two circumstances speak against its authenticity: it is in Latin, and Athanasius wrote in Greek; the expressions, again, are different from those used by Athanasius in speaking of the same things. By Protestants, therefore, and even by most Rom. Catholics, its Athanasian origin has been given up, and its production has been assigned with probability to the 5th c., and to Gaul; Hilary, Abp. of Arles (abt. 430), being conjectured to be the author. The title of Athanasian probably became attached to it during the Arian controversy in Gaul. See ARIUS; ATHANASINS CREEDS AND CONFESSIONS.

ATHANASIUS, *ăth-a-nā'shĭ-ŭs*, Primate of Egypt: 296–373; b. Alexandria: there is no record of his lineage or his parents. Alexander, then officiating as primate or patriarch of Alexandria, brought him up in his own family, and superintended his education, with the view of his entering the Christian ministry. In his youth, he often visited the celebrated hermit St. Anthony, and embraced for a time the ascetic life with the venerable recluse. He was but a youth and only a deacon when appointed a member of the first general council at Nice, in which he distinguished himself by his erudition and his eloquence.

His patron, Alexander, having died in the following year, he was duly elected to the primacy by the clergy and people; and was but newly installed in his office, when Arius, who had been banished, at the time of the condemnation of his doctrine at Nice, was recalled, and made a recantation of his erroneous principles. A., it is said, refused on this occasion to comply with the will of the emperor that the heretic should be restored to communion. On this account, and in consequence of several other charges brought against him by the Arian party, he was summoned by the emperor Constantine to appear before the synod of Tyre, 335, which deposed him from his office. His sentence was confirmed by the synod of Jerusalem in the following year, when he was banished to Treves. In 338, Constantius, now emperor of the East though unfriendly to the principles of the Trinitarians, recalled A. from his banishment, and restored him to the primacy at Alexandria. His entrance into the city was like a triumphal procession; but the Arians soon rose

against him, and (in 341) he was again condemned by a council of 90 Arian bishops assembled at Antioch. Against this decision a protest was made by 100 orthodox bishops at Alexandria; and in a council held at Sardis, 300 bishops, with Julius, Bishop of Rome, at their head, confirmed the decision in favor of A., who was again replaced in his office (349). The Arians once more acquired the ascendancy after Constantius (in 353) had been made emperor of both the East and the West; for in that year A. was condemned by a council held at Arles, and the sentence was confirmed by another held at Milan in 355, the influence of the sovereign being strongly exerted to secure his condemnation. As the resolute patriarch had declared that he would not leave his place without an express order from the emperor, violent means were resorted to for his expulsion. While engaged in conducting divine service, he was interrupted by a company of soldiers, from whom he made his escape into the Egyptian desert. A price was set on his head; and to avoid his persecutors he retired from the usual haunts of the anchorets to a remote desert in upper Egypt, where he was attended by one faithful follower. Here he wrote several works to confirm orthodox Christians in their faith. On the accession of Julian to the imperial throne, toleration was proclaimed to all religions, and A. returned to his former position as Patriarch of Alexandria (361). His next controversy was with the heathen subjects of Julian, to whom the patriarch, by his zeal in opposing their religion, had made himself very offensive. To save his life, he was compelled again to flee from Alexandria, and remained concealed in the Theban desert until 363, when Jovian ascended the throne. After holding office again as patriarch for only a short space of time, he was expelled anew by the Arians, under the emperor Valens. A. now found refuge in the tomb of his father, where he remained hidden four months, until Valens, moved by petitions from the orthodox Alexandrians, restored the patriarch to his see; in which he continued till his death.

A. was the leading ecclesiastic in a most trying period of the early church. His ability, his conscientiousness, his persistency, his fearlessness in the storms of opposition, his activity and patience, all mark him as an extraordinary man. Though twenty years of his life were spent either in exile, or its equivalent, yet his steadfastness, combined with the support of a large party, gave him finally the victory. He was a clear thinker; and as a speaker, was distinguished for extemporaneous precision, force, and persuasiveness.

His writings are polemical, historical, and moral; all marked by a style simple, cogent, and clear. The polemical works treat chiefly of the doctrines of the Trinity, the incarnation of the Son of God, and the divinity of the Holy Spirit.

The earliest edition of the collected works of A. in the original Greek appeared in two vols., folio, Heidelberg, 1600. Better is the great edition by Montfaucon (1698); and the recent standard edition in the library of the Fathers

by the Abbé Migne (1860). A.'s Four Orations against the Arians, and his Oration against the Gentiles, were translated by Parker (1713); his Treatise on the Incarnation of the Word, by Whiston (1713; another ed., 1880). The Epistles of A. in defense of the Nicene Creed, and on the Councils of Ariminum and Seleucia, together with his first Oration against the Arians, were translated, with notes, by Cardinal Newman (1842). See the church histories by Neander and others; and works on A. by Möhler (2d ed. 1844), and Böhringer (2d ed. 1874).

ATHAPASCAN STOCK (also *Tinneh*), of American Indians, and one of their most numerous and widely distributed linguistic and ethnological groups. The type-name is taken from a northwest Canadian group, the western Montagnais; but the tribes are scattered from Alaska to Mexico. The original stock were semi-arctic, along the Yukon and Mackenzie, fierce and energetic, but of a low type of culture; and spread southward by conquest on both sides of the Rocky Mountains. They are divided into three chief groups, the northern, the Pacific, and the southern. The first are those in the original home,—northwest Canada and interior Alaska,—Montagnais, Montagnards, Chippewayan, Kutchin, etc. These number about 8,500. The second are those of Washington, Oregon, and California, except the Thlinkeet coast tribes, which extend along the Alaskan coast also. These are few and scattered tribes, about 900 souls in all. The southern, and far the most important, comprises some 23,500, mostly of the great Apache and Navajo confederacies, also the Jicarillas and Mescaleros, and the Lipan, of Mexico.

ATHEISM, n. *ā′thē-ĭzm* [Gr. *athĕŏs*, denying the gods—from *a*, without; *thĕŏs*, a god: F. *athéisme*, atheism]: disbelief in the existence of God. ATHEIST, n. *ā′thē-ĭst*, one who does not believe in the existence of God; an infidel, an unbeliever. ATHEISTIC, a. *ā′thē-ĭs′tĭk*, pertaining to; or A′THEIS′TICAL, a. *-ĭs′tĭ-kăl*. A′THEIS′TICALLY, ad. *-kăl-ĭ*. A′THEIS′TICALNESS, n. the quality of being atheistical. ATHEIZE, v. *ā′thē-īz*, to render atheistic; to speak or write in an atheistic manner. ATHEIZER, n. *ā′thē-ī-zėr*, one who atheizes; one who teaches or encourages atheism. ATHEOUS, a. *ā′thē-ŭs*, in *OE.*, atheistic; godless.

A′THEISM: this term, like the term agnosticism (q.v.), is very loosely applied to any view of a religious kind held to be unorthodox. In its strict meaning it applies simply to the belief that no God exists. But Pantheism, for example, is by the advocates of Monotheism, often spoken of as atheism. On the other hand, among the Greeks, we find men accused of atheism because they rejected the notion of a plurality of Gods. In so far as the idea of God involves belief in personality it may perhaps be urged that those views can be justly designated atheistic which present the nature of God in such a way as practically to obliterate this personal element.

ATHELING, n. *ăth'ĕl-ĭng* [AS. *athel*, noble; *ing*, son of]: in *OE.*, one of noble or royal descent; the royal heir-apparent.

ATH'ELNEY, Isle of: a marsh at the junction of the rivers Tone and Parret, in the middle of Somersetshire. Here Alfred, when driven from his throne, hid from his enemies, and founded, in 888, a Benedictine abbey, now entirely gone. Among the many relics found in this spot is a ring of Alfred's, preserved in the Oxford Museum. The name Athelney means 'island of the nobles,' or 'royal island.'

ATHELSTAN, *ĕth'ĕl-stăn*, Saxon monarch who first took the title King of England: abt. 895–941, Oct. 25; grandson of Alfred the Great. Alfred had assumed the title only of King of the Anglo-Saxons. Athelstan was crowned at Kingston-upon-Thames, 925, and seems to have had ambition and talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. His resources, however, were not equal to the undertaking, and he had to content himself with the acquisition of portions of Cornwall and Wales. On the death of Sigtric, King of Northumbria, who had married one of his daughters, A. took possession of his dominions. This excited the alarm and animosity of the neighboring states, and a league, composed of Welsh, Scotch, and Irish, was formed against the English king, for the purpose of placing Aulaff, the son of Sigtric, on his father's throne. A fierce and decisive battle was fought at Brunenburgh, in which the allies were utterly defeated, and which became famous in Saxon song. After this, the reputation of A. spread to the continent. His sisters were married into the royal families of France and Germany, and he had great influence and consideration. At home, he showed deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He died at Gloucester.

ATHENÆUS, *ăth-a-nē'ŭs:* a Greek *rhetor* and *littérateur*, at the close of the 2d and beginning of the 3d c.; b. Naucratis, Egypt. His work, entitled *Deipnosophistæ* (Banquet of the Learned) in fifteen books, but of which remain only the first two, and parts of the third, eleventh, and fifteenth in an abridged form, is very interesting, as it preserves copious fragments of old writers, and treats, in the form of dialogue, of almost all the topics of ancient Greek manners, private and public life, arts, sciences, etc. The work is not indicative of genius or of high ability; the author, for the most part, appears in the character of an agreeable, well-read, epicurean gentleman, excessively fond of *tid-bits*, both of scandal and cookery. He tells many stories to the disadvantage of people whom history praises; but these we are by no means bound to believe, nor, indeed, is he a man whose opinions are worth much on any subject, but as a melange of literary, social, and domestic gossip, the value of the work is unrivalled. A. appears to have read enormously; he states that he had made extracts from 800 plays of the middle comedy alone;

but his dialogue is prolix and lumbering. The best editions are by Schweighäuser (14 vols. 1807), Dindorf (3 vols. 1827), Meineke (4 vols. 1867). There is an English translation of A. (3 vols. in Bohn's series, 1854).

ATHENAGORAS, *ăth-ē-năg'ō-ras:* Christian philosopher in the 2d c., who taught first at Athens, afterwards at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis,* which he addressed to the emperor Marcus Aurelius, 177. He therein defended the Christians against the monstrous accusations of the heathen, viz., that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit, and is marked by great clearness and cogency of style. There remains also a valuable treatise of A. on the resurrection of the dead.

ATHENAIS *ăth-ē-nā'-ĭs:* b. Athens abt. the end of the 4th c.; d. 460; dau. of Leontinos the Sophist. She received from her father a superior education, being skilled in Greek and Latin literature, rhetoric, astronomy, geometry and the science of arithmetic. After his death she went to Constantinople, to obtain justice for the harsh treatment to which her brother subjected her. Here her beauty and intelligence made her the favorite of Augusta Pulcheria, sister of Theodosius II., who considered that she would make an excellent wife for the emperor. In 421, A., having been baptized and named Eudocia, was married to Theodosius, and in 438, made a splendid pilgrimage to Jerusalem, bringing with her, on her return, the supposed relics of the first martyr, Stephen. Aftewards, she lost the favor of Pulcheria—the real manager of affairs—and was banished from the court, retiring to Jerusalem, where she suffered many persecutions, and died, in the odor of sanctity. A. wrote an epic poem on the war of Theodosius against the Persians, and several other metrical works, which have not been preserved.

ATHENE, or Athena: see Minerva.

ATHENEUM, or Athenæum, n. *ăth'ĕ-nē'ŭm* [Gr. *Athenaion,* the temple of Minerva at Athens; *Athēnē,* the goddess Minerva]: a public reading or lecture room. The A. at Athens was frequented by poets, learned men, and rhetoricians, who there read aloud their works.—The A. in Rome was a school or college erected, by the emperor Hadrian, for the study of poetry and rhetoric, with a regular staff of professors. It existed for a long period. In the time of Theodosius II., it had three professors of oratory, ten of grammar, five of sophistry or dialectics, one of philosophy, and two of jurisprudence.—In modern times, the name A. has been revived as an appellation for certain literary institutions, and also as a collective title for literary essays and reviews. A. is the title of two weekly journals of literature, science, and art—one published in London, the other in Paris.

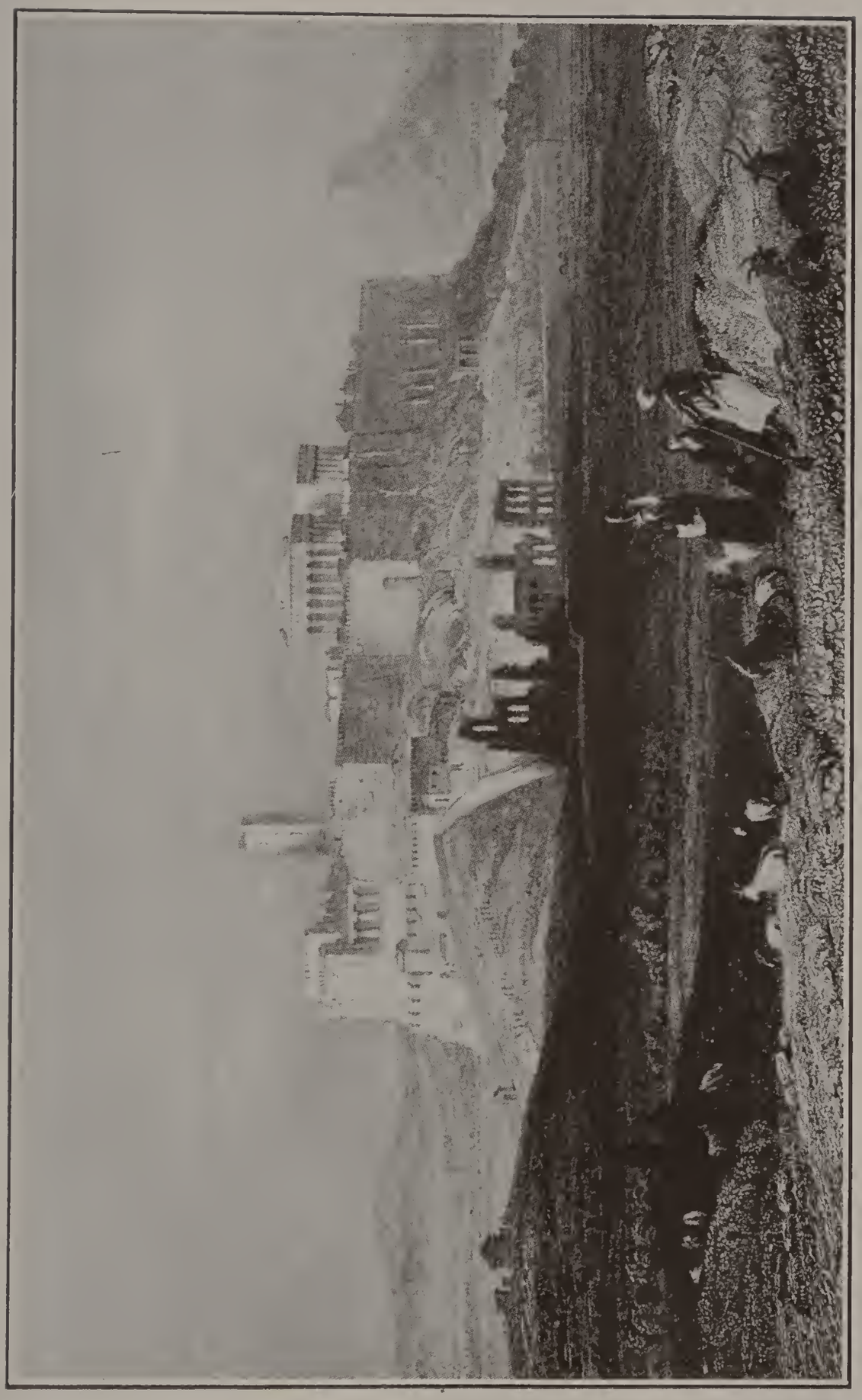
ATHENIAN, a. *ă-thē'nĭ-an:* of Athens· N. an inhabitant of Athens.

ATHENS, *ăth'ĕnz:* cap. of the ancient state of Attica; said to have been founded by Cecrops, about B.C. 1500, and styled Cecropia; but even the ancients themselves doubted this tradition. Equally uncertain is the story that it was first styled A., in honor of Athene, during the reign of Erichthonius. The ancient citadel was situated on a square craggy rock, 513 ft. high, with a flat summit 1,000 ft. long, and 500 broad. Gradually, as population increased, A. extended over the wide and beautiful plain below. This increase is said to have been due to the organization of the twelve Attic tribes into a political confederacy or union by Theseus, the brightest figure in the 'dark ages' of Attic history. The position of A. near the Gulf of Saronica, opposite the eastern coast of the Peloponnesus, was favorable to the acquirement of naval power. The city, four or five miles from the sea, had three harbors, all situated on the s.w. side, and connected with it by walls. The oldest of these harbors was Phalerum, the nearest to the city, and accessible at all times by a dry road. The Piræus was used as a harbor first by Themistocles. Munychia was the Acropolis of the whole rocky peninsula termed the Piræus, and of immense importance strategetically. The last two harbors were connected with the city by the famous 'long walls,' of which we read so much in Athenian history. They were forty stadia, or nearly five m. in length. Two streams flowed in the vicinity of A.; on the e. side, the Ilissus, which also washed the s. part of the city; and on the w., the Cephisus, about a mile and a half beyond the walls. To the w. lay Salamis, with Eleusis on the n.w., Phylæ and Decelea on the n., Marathon on the n.e., and Hymettus on the s. All along the coast were splendid buildings.

The whole of the magnificent prospect was crowned by the Acropolis, where all the most glorious monuments of A. were assembled. First rose the Parthenon (q.v.), or Temple of Minerva, a pile which even now, after the lapse of centuries, remains among the wonders of the world. The Propylæa, all built of white marble, formed the entrance to the Parthenon, Close to it, on the n. side of the Acropolis, rose the Erechtheium, the most venerated of all Athenian sanctuaries, and connected with the oldest religious history of the city. The whole of it was destroyed by thePersians, but was restored during the Peloponnesian war. Its ruins still exist, and give a correct idea of the external form and structure. In some points it differed from all other Greek temples. It is sufficient to say, of the many magnificent buildings which were the glory of ancient Athens, that gods were never more superbly honored in any land. The enthusiastic love of the beautiful which animated the Athenians, turning their religion into an art, and making worship an education in æsthetics, is nowhere so clearly visible as in their religious architecture. Their mythological faith stood daily before their eyes in monumental splendor, for almost every deity had his temple or shrine in the city. Two of the finest buildings—the Temple of Theseus, and that of Jupiter Olym-

pus—were on the outside of the city; the first to the n.w., and the second to the s. The former, built about B.C. 465, therefore older than the Parthenon, was both a temple and a tomb, inasmuch as it held the remains of Theseus himself. It had the privilege of an asylum for slaves, and the large space of ground which it inclosed was frequently used as a muster-ground for the Athenian soldiery. It was built of the favorite Pentelic marble, in the Doric style of architecture, and is the best preserved of all the monuments of ancient Athens. For centuries it was a Christian church, appropriately dedicated to St. George, the chivalrous hero of the 'dark ages' of Christianity, as Theseus had been of the 'dark ages' of the Attic history; but is now the national museum of the city. The Temple of Jupiter, of which fifteen grand Corinthian columns are still extant, to the s.e. of the Acropolis, and near the the right bank of the Ilissus, in size, splendor, and beauty excelled all other Athenian structures. Immense sums of money were expended upon it from the time when it was commenced by Peisistratus, until it was completed by Hadrian, a period of 700 years. The building of it was frequently suspended, so that Philostratus calls it 'a struggle with time.' At the time the Persians sacked the city, it was fortunately only beginning to be built, and so escaped destruction. Aristotle speaks of it as a work of despotic grandeur, and equal to the Pyramids of Egypt. The exterior was decorated by about 120 fluted columns, 61 ft. in height, and more than 6 ft. in diameter. It was 354 ft. long, and 171 broad, and contained the celebrated statue of the Olympian Jupiter in ivory and gold, the work of Phidias.

Besides these wonders of art, the city contained places of interest of which the memory will perpetually remain—the Academy where Plato, whose estate lay near it, gave his lessons in a grove of plane-trees adorned with statues; tradition alleged it to have belonged originally to Academus. Hipparchus surrounded it with a wall, and Cimon adorned it with walks, fountains, and olive-groves. The Lyceum, most important of the Athenian gymnasia, where Aristotle lectured; and, near to this, the Cynosarges, where Antisthenes the Cynic expounded his 'harsh and crabbed' doctrine; the hill of the Areopagus, where the most venerable court of judicature was held; and the Prytaneum, or senate-house. About a quarter of a mile to the w. of the Acropolis is a low hill, which marks the locality of the Pnyx, a place of public asssembly, forming a large semicircular area. bounded at the base by a limestone wall, from which projects a pedestal, carved out of the rock, and ascended by steps. This most interesting place has been preserved almost in its integrity, and, as we look around, we are carried back to the times when some six thousand Athenian citizens were here assembled, when the orator, standing upon the pedestal, could survey the Acropolis, with all its temples, the venerable Areopagus, and beyond the city, the extended plains and villages of Attica, with corn-fields, olive-grounds, and vineyards.



ACROPOLIS FROM THE HILL OF THE MUSEUM.

A., in its most flourishing period, numbered 21,000 free citizens; from which we may calculate that it contained about 200,000 inhabitants. More than two thousand years have passed over the beautiful city, and still its remains excite the admiration of the world. The Turks surrounded it with wide irregular walls, partly built out of the ruins of the old walls, and containing many fragments of noble columns. Of the Propylæa, the right wing, or Temple of Victory, was destroyed in 1656 by the explosion of a powder-magazine. Six columns, with lofty arches, remain to mark the site of the opposite wing. The interior of the Parthenon was used for some time as a Turkish mosque. Eight columns remain on the e. of the front, several colonnades at the sides; and of the back pediment, where the combat of Minerva and Neptune was sculptured, nothing remains save the head of a sea-horse, and two decapitated female figures. Of the pediment in front, several figures belonging to the group representing the birth of Minerva are preserved in the British Museum, and justly regarded as masterpieces of ancient sculpture. Of all the statues which the Parthenon contained, only one, that of Hadrian, has been preserved. Ruined as it has been, the general aspect of the Parthenon is still sublime. Of the Erechtheium (or Temple of Neptunus Erechtheius) there are considerable remains, especially the beautiful female figures styled Caryatides.

The situations and vast extent of the two theatres may still be traced, though grain is now grown in the arenas. All these remains belong to the Acropolis. In the city below, there are no such splendid memorials. The Horologium, or octagonal Temple of the Winds (built by Andronicus Kyrrhestes), has been well preserved; but a few fragments found in broken walls are all that remain to tell of the splendid Gymnasium built by Ptolemæus. Beyond the city, the attention of the spectator is arrested by the sublime ruins of the Temple of Jupiter Olympus. Pedestals and inscriptions have been found here and there, sometimes buried in the earth. The sculptures on the friezes of the interior of the Temple of Theseus, representing the exploits of Theseus, have been well preserved, while the external sculptures are almost utterly destroyed. A Turkish burial-place now occupies the hill where the Areopagus held its sittings. The site of the Lyceum is indicated only by scattered stones, and a modern house and garden occupy the place of the Academy. Scarcely anything remains to show the old magnificence of the harbors Piræus, Phaleros, and Munychia.

It is probable that, in the time of Pausanias, many structures remained belonging to the period before the Persian war, as Xerxes, during his short time of mastery over A., would scarcely have been able to destroy more than the fortifications and principal public buildings. Themistocles, in his restoration of the city, had chiefly a regard to utility; Cimon paid attention to its decoration; but Pericles far exceeded them in the magnificence of his designs, which were too vast to be carried into effect in later times. The

civilization, spreading from A. as its centre, raised Macedon and other states into dangerous rivalry. The defeat at Chæroneia was as fatal to the fine arts as to the liberty of the Athenians. After the works at the Piræus had been destroyed by Sulla, the naval power, and with it the whole political importance of A., rapidly declined It is true that the city was treated leniently by its conquerors; the temples and statues were preserved from violation, and A., with all the trophies of eight centuries of greatness, remained under the Antonines; but the free national spirit of the Athenians had departed for ever, and slowly, but surely, the fine arts shared the fate of Grecian liberty. Their treasures, which had been spared by the Roman emperors, were gradually stolen away by various thievish collectors, especially for the decoration of Byzantium, or were destroyed by unthinking Christian zeal and barbarian invasion. About A.D. 420, the ancient religion and temple service of A. had entirely disappeared; afterwards, the schools of philosophy were closed by Justinian, and Greek mythology was gradually forgotten. St. George took the place of Theseus, and the Parthenon was converted into a church. The surviving industry of A. was injured by Roger of Sicily, who removed its silk manufactures. In 1456, A. fell into the hands of Omar, and, to consummate its degradation, under the low, sensual Turks, the city of Athene was regarded as an appanage of the harem, and governed by a black eunuch. The Venetians, having captured the city in 1687, intended to carry away as a trophy the quadriga of victory from the w. front of the Parthenon, but shattered it in their attempt to remove it. In 1688, A. was again delivered into the hands of the Turks, and the work of demolition now proceeded rapidly. The grand remains of antiquity were used as quarries to supply materials for all ordinary buildings, and, in the course of another century, the city was reduced to its lowest point of degradation.

Modern A. (styled by the Turks Athina or Setines) is now the capital of the new kingdom of Greece, Previous to the Greek revolution (1821), it was a provincial city of inferior importance, the seat of a Greek metropolitan bishop, and under the jurisdiction of the Turkish governor in Euboea. In 1821, the war of liberation commenced, and the Turks surrendered Athens in the following year; but again captured it in 1826, and took the Acropolis in 1827. After this it was left in ruins until 1830, when Attica was declared united with Greece by the protocol of the London Conference. In 1834, Otho, the son of the Bavarian monarch, who had been elected to the sovereignty of the new kingdom, removed his residence from Nauplia to A. Improvements now proceeded rapidly: Turkish manners and customs disappeared; the contemptible wooden houses and crooked streets were superseded by new ones—among which the Hermes, Æolus, Athene, and New Stadion streets are conspicuous; and, in 1836, the foundation of a new palace was laid, completed in 1843. The municipal affairs of A. are now regulated by a mayor (demarchos) and council elected by the citizens. Modern A. has a gymnasium, a

TEMPLE OF THEBES AT ATHENS.

library enriched with many donations from France and Germany, and a university. Much literature is published here. The French and United States governments have each founded an Archæological Institute in the city. A. has soap-works, leather-works, and silk and cotton factories, and is an important railroad centre. The port is at Piræus. Pop. (1896) 111,486.

Political History.—It was the Ionic race that manifested most signally the distinguishing characters of Greek civilization; and of this portion of Hellas, A. in the brilliant part of its history, stands out most prominently. According to tradition, its political power was first established by Theseus, King of Attica, who made A. the metropolis. Here he instituted the great popular festival of the Panathenæa, and, by encouraging settlements in the city, greatly increased its population. He divided the citizens into three classes: nobility, agriculturists, and mechanics. Until the death of Codrus, B.C. 1068, A. was governed by kings; afterwards, by archons elected from the nobility. The time of holding office was limited to ten years, B.C. 752, and to one year B.C. 683, when nine archons were annually elected, one being called the *archon eponymus*, because the year was distinguished by his name. Here begins the authentic history of A. These archons together with the council of nobles, afterwards called the Areopagus, exercised the whole power of the state, and administered justice. The Athenian government was thus, like all other Hellenic governments, an oligarchy; but the changes introduced by the archon Solon, B.C. 594, though remarkably moderate, laid the foundation of that democratic constitution which was perfected by Cleisthenes. The condition of the population at the time of Solon was one of extreme suffering and discord, arising chiefly from the oppressive execution, by the aristocratic archons, of the law of debtor and creditor. This law was of old extremely harsh in Greece as well as in Rome; it assigned the debtor that could not fulfil his contract as the slave of his creditor. The great part of the soil of Attica was in the hands of the rich, and the mass of the population, who tilled the lands as tenants, were either in hopeless arrears, or already, with their families, actual slaves. Driven to desperation, the populace were ready to rise in mutiny; the oligarchy were afraid or unable to enforce the laws; and thus it was agreed to confer dictatorial power on Solon, well known for his wisdom, integrity, and sympathy with the people, and allow him to solve the problem. The disease being desperate, Solon applied the desperate remedy of abolishing existing contracts, liberating those that had been reduced to slavery, and forbidding for the future any one from pledging his own person or that of a member of his family. He next reformed the political constitution by dividing the freemen into four classes, according to the amount of their property. It was only the richer classes that paid taxes and were eligible to the offices of state; but all had votes in the assembly that elected the archons,

and all sat in judgment on their past conduct, on the expiry of their year of office. The government, though still oligarchical, was thus modified in the direction of democracy by popular control. Its free operation was for some time (B.C. 560–510) interrupted by the usurpation of Peisistratus and his sons, whose *tyranny*, however, was mild and enlightened, the forms at least of the Solonian constitution being preserved.

On the banishment of the Peisistratidæ (B.C. 510), a further political reform was introduced by Cleisthenes, who extended the basis of the constitution, and rendered it essentially democratic. To Cleisthenes is ascribed the origin of the practice called *ostracism* (q.v.).

Then followed the brilliant period of the Persian war, when out of the circumstances which had seemed to threaten destruction, A. rose to the highest point of power and prosperity. Miltiades at Marathon, and Themistocles at Salamis, gained the victories which infused new courage and enthusiasm into the Greek nation. The period between the Persian war and the time of Alexander the Great, B.C. 500–336, was the most glorious in Athenian history; and in 444, Cimon and Pericles raised the city to its highest point of grandeur and beauty. But under Pericles, the beginning of a decline took place, through the decay of ancient morals and the Peloponnesian war, which ended in the capture of A. by the Lacedæmonians. After this, A. retained only the shadow of its former power and dignity. The thirty appointed ministers of government were, in fact, so many tyrants, supported by the Lacedæmonian army. After eight months of despotism had been endured, the tyrants were expelled by Thrasybulus, a free constitution was restored to A., and a new period of prosperity commenced. But it did not long endure; a formidable foe, Philip of Macedon, appeared in the north. The Athenians having opposed him in the Phocian war, Philip took from them several of their colonies. Then followed the defeat of the Athenians at Chæroneia (B.C. 338), a fatal blow. A. with other states became subject to Macedon. The free spirit of the citizens was broken, and they degenerated in moral character. After Alexander's death, a fruitless attempt was made to regain their liberty. Antipater instituted an oligarchy of wealth. Soon afterwards, A. was taken by Cassander, and placed under the rule of Demetrius Phalereus, who employed his power wisely and beneficently. Once more the old constitution of A. was restored by Demetrius Poliorcetes, and a short interval of independence was enjoyed, until the city was taken by Antigonus Gonatas. After liberating themselves from the dominion of Macedon, and joining the Achaian confederacy, the Athenians were so misguided as to support Mithridates against the Romans. This last error was fatal. Sulla conquered A., destroyed the port of the Piræus, and left only the appearance of liberty and independence, which entirely vanished in the time of Vespasian. Still, after the spirit of liberty and progress had departed, A. long remained safe from spoliation. The Romans, in their

RESIDENCE OF DR. SCHLIEMANN, ATHENS.

respect for Grecian pre-eminence in art and philosophy, moved also by religious reverence, long regarded Athens as a captive too noble and beautiful to suffer any indignity.

ATHENS: city and county-seat of Clarke co., Ga.; on the Oconee river and on the Central of Georgia, the Georgia, the Southern and the Seaboard Air Line railroads; about 70 m. n. by e. of Atlanta. It has a large trade in cotton and contains cotton and woollen, cotton-seed oil, bobbin and hosiery mills, iron works, furniture factories and other factories. A. is the seat of the Univ. of Georgia, the State College of Agriculture and Mechanical Arts, Lucy Cobb Institute, Knox Institute, Jeruel Academy, and a State Normal School, and contains schools, churches, banks, hotels, and daily, weekly and monthly publications. There are electric lights and street railways, the city owns and operates the water-works and the government is vested in a mayor, elected for two years, and a city council. A. was first settled about 1800–1. Pop. (1910) 14,913.

ATHENS, American School at: an institution for classical study, in Athens, Greece. It was founded in 1882; is a branch of the Archæological Institute of America; and is managed by a committee representing the various colleges in the U. S. which contribute to its support. The building, which was erected by means of private subscriptions, is built on grounds donated by the Greek Government, and the institution has an endowment of $50,000. The students are engaged in studying the remains of Greek civilization, and the excavations at Eretria and Argos.

ATHERINE, *ăth′ē-rīn* (*Atheri′na*): genus of small fishes, allied to the Mullet family (*Mugilidae*), but latterly separated into a distinct family, *Atherinidae*. The Atherines have more than twice as many vertebræ as the Mullets; they are of a rather slender form, but few of them exceed six inches in length. They have a protractile mouth, and very small teeth; some are quite toothless. Almost all the known species, which are numerous, and found in the seas of different parts of the world, have a broad silvery band along each flank. Some of them are much esteemed for their delicacy. They abound in the Mediterranean. One species, *A. Presbyter*, is very common on the s. coast of England and on some parts of the coast of Ireland, but is rare on the e. coast of Britain.

ATHEROMA, n. *ăth′ĕ-rō′mă* [Gr. or L. *atherōma*, a tumor filled with matter]: a form of fatty degeneration; a curdy tumor; a disease affecting the inner coat of the arteries. (See Arteries, Diseases of.) Atheromatous, a. *ăth′ĕr-ŏm′ă-tŭs*, containing matter of the nature of atheroma.

ATHEROSPERMA, n. *ăth-ėr-ŏ-spėr′ma* [Gr. *ather*, the beard or spike of an ear of corn; *sperma*, seed. So called

from the seed being crowned by a permanent hairy style]: genus of plants, the typical one of the order *Atherospermaceæ*.

ATHEROSPERMACEÆ, n. pl. *ăth-ėr-ŏ-spėr-mā'sē-ē* [from the typical genus *atherosperma*: an order of exogenous plants placed by Lindley in his Menispermal Alliance. Their English name is *plume nutmegs*. They are unisexual plants, having neither calyx nor corolla, but only an involucre. In the male flowers the stamens are numerous; in the female, they are less so. Each involucre has several ovaries, with solitary erect ovules, which afterwards become feathered at the summit by the persistent styles. They are natives of New Holland and South America. In 1846, Lindley estimated the known species at four only.

ATH'ERSTONE: market-town of Warwickshire, England; on the borders of Leicestershire, 16 m. n.e. from Birmingham; on the Roman road called Watling Street. The town is irregularly built; many houses are very ancient. Pop. 4,000.

ATHETOSIS, n. *ăth-ĕ-tō'sĭs* [Gr. *athetos*, unfixed, changeable]: disease in which the patient is unable to control the slow and irregular movements of fingers and toes due to a spinal or cerebral disturbance. ATHETOID, resembling or pertaining to.

ATH'ERTON, CHARLES GORDON, American politician: b. Amherst, N. H., 1804; d. Manchester, N. H., 1853, Nov. 15. He was graduated from Harvard in 1822, was a member of the New Hampshire legislature for five years and speaker of the lower house for four, and in 1837–43 was a Democratic representative from New Hampshire in Congress. In 1843–9 and 1852–3 he was a member of the Senate. On 1838, Dec. 11, he introduced in the house the so-called 'Atherton gag' resolution, which provided that all bills or petitions on the subject of slavery should be 'laid on the table without being debated, printed, or referred.' The resolution was passed by a vote of 126 to 73, and remained in effect until 1844. It was resolutely opposed by J. Q. Adams, who advocated the 'right of petition.' Adams was ultimately victorious, and on 1844, Dec. 3, the 21st rule of the House, providing that no paper praying the abolition of slavery or the slave trade should be in any wise entertained, was abolished by a vote of 108 to 80.

ATHERTON, GEORGE WILLIAM, American educator: b. Boxford, Mass., 1837, June 20; d. 1906, July 24. He worked his way through Phillips Exeter Academy and Yale College; was professor of political economy and constitutional law in Rutgers College, N. J., in 1869–82; was admitted to the bar of New Jeresy in 1878; and became president of the Pennsylvania State College in 1882. He wrote *Magna Charta, a Comparative View of the Barons' Articles and the Great Charter.*

ATHERTON, GERTRUDE FRANKLIN (HORN), Ameri-

can novelist: b. San Francisco in 1857. Since the death of her husband she has chiefly pursued a literary career. She has written *The Doomswoman* (1892); *Before the Gringo Came* (1894); *A Whirl Asunder* (1895); *Patience Sparhawk and Her Times* (1897); *His Fortunate Grace* (1897); *American Wives and English Husbands* (1898); *The Californians* (1898); *A Daughter of the Vine* (1899); *The Valiant Runaway* (1899); *Senato North* (1900); *The Aristocrats* (1901); *The Conqueror* (1902); *The Splendid Idle Forties* (1902); a revision of *Before the Gringo Came; A Few of Hamilton's Letters* (1903); *Rulers of Kings* (1904); *The Bell in the Fog* (1905); etc.

ATH'ERTON: a manufacturing town of England, Lancashire, 13 miles northwest of Manchester, containing cotton-factories, collieries, iron-works. Pop. (1900) 16,200.

ATHIRST, a. *ă-thėrst'* [AS. *a*, on, and *thirst*]: thirsty; wanting drink.

ATHLETE, n. *ăth'lēt*, plu. ATHLETES, *ăth-lē'tēz*, or *ăth-lētz'* [Gr. *athlētēs*, a wrestler—from *athlos*, a contest]: a wrestler; one who contends in public games in trials of strength. ATHLETIC, a. *ăth-lĕt'ĭk*, pertaining to trials of strength; strong; robust; vigorous. ATHLET'ICALLY, ad. *-kăl-ĭ*. ATHLETICISM, n. *ăth-lĕt'ĭ-sĭzm*, the art of training one as an athlete; the state of being so trained; athletics. ATHLETICS, n. *ăth-lĕt'ĭks*, the art of developing muscular strength for the sake of prize or other contests, or for the ordinary physical work of life. ATHLETISM, n. *ăth'lĕ-tĭzm'*, muscular strength.

ATHLETICS: in ancient Greece, athletics formed an important part in the educational system, as well as in the national life. Of the four great national festivals, of which athletic games were always a part, the Olympic games are most famous. These contests included foot-races, wrestling, boxing, horse-racing, and chariot-racing. None but Greeks of pure descent were allowed to take any part in these games until the conquest of Greece by the Romans, when they were also admitted to the contests. The prize awarded to the victor was merely a garland of wild olive, but the honor of gaining such a prize was so highly esteemed that a victor in the Olympic games was regarded as bringing glory not only to himself but to his family and to the city or state to which he belonged. Even men of genius took part in athletic contests; Chrysippus and Cleanthes, the philosophers, were famous athletes; Plato appeared among the wrestlers at the Isthmian and the Isthmian games; and Pythagoras gained a prize at Elis. There were also a considerable number of men, who made athletics their principal business, contending at the public festivals, and regulating all their habits of life to that end. These athletes were highly honored; the victors received special privileges, had a yearly pension and the foremost seat at the sacred games. Athletic sports, first witnessed at Rome B.C. 186, were introduced by M. Fulvius at the end of the

Ætolian war, and became very popular at the time of the emperors. The athletes at Rome formed a corporation. In the Middle Ages the contests and tournaments of chivalry took the place of athletics, and it was not until modern times that athletic sports very similar to ancient Greek sports have been revived, and have attained an important place in the life of the people.

In the U. S. with the disappearance of the modes of life of the earlier days, calling for a large amount of physical strain and with the return of comparative leisure, there reappeared a desire to supply artificially the physical effort, the stress and contest of former times. So athletic contests were organized first by isolated colleges and clubs, and subsequently in such a volume as to need a separation of contests into classes and the creation of an especial federation of the separate units, to regulate and control. Ultimately the lines of natural cleavage forced athletics into its two great branches, one, out-door contests and games, the other gymnasium work. The out-door events are those which are now usually meant when the term athletics is used. With the growth of the number and importance of athletic contests the Intercollegiate Association of Amateur Athletes was organized to control inter-collegiate athletics, and the Amateur Athletic Union to control contests of clubs and associations outside of the colleges and universities. There are besides the professional athletes, ball-players, etc., who make of athletics their principal business; these, however, have no connection with the amateur associations, the rules of the latter being very strict against contesting with professionals and against their members competing for 'compensation or reward.'

Of all inter-collegiate sports, foot-ball is the most important; base-ball, rowing and track-team contests also have their place in the rivalry between colleges. In the athletic life of the students within the different institutions, all these naturally have an important place, both in the preparation for the inter-collegiate contests, and in inter-class games. Swimming, lawn-tennis, golf, and basket-ball also are a part of college athletics. The Amateur Athletic Union has jurisdiction over base-ball, bicycling, boating, bowling, cross-country running, foot-ball, lacrosse, lawn-tennis, racquets, skating, swimming, walking, and the contests at field-meetings, such as pole-vaults, hurdling, jumping, throwing the hammer, etc. The Union consists of the *Metropolitan Assoc.*, comprising the States of New York and New Jersey, north of Trenton; the *New England Assoc.*, comprising Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut; the *Atlantic Assoc.*, comprising New Jersey, south of and including Trenton, Delaware, Maryland, Pennsylvania, West Virginia, District of Columbia, Virginia, North Carolina, South Carolina, Florida, and Georgia; the *Central Assoc.*, comprising Ohio, Illinois, Indiana, Michigan, Wisconsin, Iowa, Minnesota; the *Pacific Assoc.*, comprising California, Arizona, Nevada,

Utah, Idaho, Oregon, and Washington; the *Southern Assoc.*, comprising Alabama, Louisiana, Florida, Mississippi, Texas, Georgia, and Tennessee; the *Western Assoc.*, comprising Missouri, Wyoming, Arkansas, Oklahoma, South Dakota, North Dakota, Indian Territory, Kansas, Kentucky, New Mexico, and Colorado; and the *Pacific Northwest Assoc.*, comprising Idaho, Montana, Oregon, Washington, and Alaska.

The athletic events at outdoor field meetings are for 100, 220, 440, and 880 yards run; 1 and 5 mile run; 1 and 3 mile walk; 2 mile bicycle ride; pole vault for height; running high and broad jumps; throwing 16-pound hammer; throwing 56-pound weight, for distance; putting 16-pound shot; 120 yards hurdle-race, 10 flights 3 feet 6 inches high; 220 yards hurdle-race, 10 flights 2 feet 6 inches high; and at indoor meetings, for runs of 75, 150, 300, 600, and 1,000 yards; 2 mile run; three quarter mile and 4 mile walk; standing, broad, and high jumps; three standing broad jumps; running hop, step, and jump; pole vault for distance; throwing 56-pound weight for height; putting 24-pound shot; 200 yards hurdle-race, 10 flights 3 feet 6 inches high; 300 yards hurdle-race, 10 flights 2 feet 6 inches high; and tug of war, 4 men, unlimited weight. In the latter part of the 19th century the Olympic games were revived at Athens, in which representatives of all nations were allowed to contest. In the games of 1906, American athletes won the greatest number of points (75 1-16), and England came second with 41.

ATHLONE, *ăth-lōn′:* small town in the centre of Ireland, on both sides of the Shannon, chiefly in the county of Westmeath, but partly in that of Roscommon. It is the largest town between Dublin and Galway, and lies on a commanding situation 6 m. below Lough Ree, in a carboniferous limestone district. The chief manufactures are felt hats, friezes, linens, and stays. A canal here, a mile long, enables large river steamers to navigate the Shannon for 116 m. from Killaloe to Carrick-on-Shannon, uninterrupted by the river rapids. The Shannon is crossed by a fine bowstring and lattice iron bridge of two arches, 175 and 40 ft. span. Till 1885 A. returned one member to parliament. Pop. 6,755.

ATHOL, *ăth′ŭl:* post village in Worcester co., Mass.; on Miller's river, from which great water-power is obtained. It is 70 m. w.n.w. of Boston, 28 m. n.w. from Worcester, 48 m. n.e. from Springfield; at the junction of the Boston and Albany and the Fitchburg railroads. It has several banks, weekly and monthly periodicals, a public library, electric railways, etc. The manufactures include boots and shoes, cotton, sewing silks, mechanical tools, furniture, etc. Pop. (1910) 8,536.

ATHOLE, *â′thŭl* [Pleasant Land]: a dist. of 450 sq. m., in the n. of Perthshire, occupying a great part of the s. slopes of the Grampian Mountains, and intersected by

many narrow glens, down which flow the rapid tributaries of the Tay. It is chiefly composed of gneiss and quartz rock, with beds of primary limestone. Dr. Hutton's explorations among the granite veins in Glen Tilt were among the chief means of establishing the Plutonic theory of geology. A. was once one of the best hunting districts in Scotland. Athole deer-forest is said to contain 100,000 acres, and 10,000 head of deer, of which 100 are killed annually. In the picturesque Pass of Killiecrankie, in this district, 17 m. n.w. of Dunkeld, Claverhouse fell in 1689, though victorious over the troops of King William III.

A'THOR, or ATHYR, but properly, *Het-her*, i.e., 'the habitation of God': an Egyptian goddess who, in the mythological system of that people, is ranked among the second class of deities. She was the daughter of Ra, the sun. By the Greeks, she was identified with Aphrodite (Venus). The cow was regarded as her symbol, and in hieroglyphics she generally appears with the head of that animal bearing between her horns the figure of the sun's disk. A. is also represented as a cow itself, and as a bird with human face, horns, and the sun's disk. On the oldest monuments, she is frequently portrayed bearing a temple on her head, as in the Athor-capitals of the Ptolemaic buildings, falsely supposed to be heads of Isis. Originally, the goddess had a cosmogonic significance; later, she was called the 'mistress of dance and jest,' and held in her hands, as symbols of joy, the cord of love and the tambourine. Queens and princesses were often represented by the figure of A. Her worship was general in Egypt. Her most sacred abode was at Denderah. After her the third month of the Egyptian year was named.

ATHOS, *ăth'ŏs*, HA'GION O'ROS, or MON'TÉ SAN'TO, i.e., the Holy Hill: the principal mountain of a chain extending in a peninsular form, from the coast of Macedonia into the Ægean Sea, between the gulfs of Contessa and Monté Santo, and connected with the mainland by a narrow isthmus. The length of the peninsula is 40 m.; breadth, 4 m. According to tradition, it received its name from A., son of Neptune, or from A., a giant who battled against the gods. The highest summit in the chain, or Mount A. proper, a solitary peak at the s. extremity of the peninsula, rises 6,350 ft. above the sea. In ancient times, several towns were built on A. Herodotus mentions five. The most memorable thing in connection with A. is the canal which Xerxes cut through the isthmus, in order to escape the stormy gales which rendered the navigation round the promontory very perilous, and which had shattered the fleet of Mardonius some years before. Traces of this canal still exist. In the middle ages, A. was covered with monasteries, of which 20 remain (besides several hermitages, chapels, etc.). The largest are the monasteries of Ivoron and St. Laura; the richest, Vatopædi. The entire number of monks who inhabit the 'Holy Hill' is about 8,000. They form a kind of monastic republic

under the Turkish government, to which they pay an annual tribute of nearly $20,000. The monks follow the rule of St. Basil, and lead an ascetic life, engaged chiefly in agriculture, gardening, and the care of bees. In diet, they restrict themselves to herbs, fruits, and fish. They carry on a considerable trade in amulets, images, crucifixes, wooden articles of furniture—all of their own manufacture—and reap profits from the numerous visits of pilgrims. They also collect alms to pay their heavy yearly tax to the Porte. There is an academy in which the younger monks receive instruction in various subjects. The libraries of the monasteries are rich in literary treasures, particularly in manuscripts, partly procured from Constantinople before its conquest by the Turks, partly presented to them from the same place, and partly written by the laborious monks. Many books have been brought thence to the great collections at Paris, Vienna, etc., and the rest are but little used among the monks themselves. Their monasteries and churches are the only ones in the Ottoman empire which have bells. Every nation belonging to the Greek Church has here one or more monasteries of its own, annually visited by pilgrims from Russia, Servia, Bulgaria, etc., as well as from Greece, Asia Minor, and Constantinople. The privileges which the members of the various establishments enjoy they owe to Murad II., who, on account of their voluntary submission, even before the capture of Constantinople, granted them his protection. Hermits were established on Athos in the middle of the 9th century, and the first monastery, that of St. Lavra, was founded by the monk Athanasius in 968. Caryes, the principal place in the peninsula, is picturesquely situated in the midst of vineyards and gardens, and has 1,000 inhabitants. Here the market is held; but no female, even of any animal, is permitted to be present, or even to enter the peninsula.

ATHRIXIA, n. *a-thriks'ĭ-a* [Gr. *athrix*—from *a*, without; *thrix*, hair, in allusion to the absence of hairs from the receptacle and the stigmas of the ray]: genus of plants belonging to the order *Asteraceæ*, or *Composites*. *A. capiensis* is a pretty greenhouse shrub, with narrow lanceolate leaves and bright crimson, solitary heads of flowers.

ATHWART, prep. *ă-thwawrt'* [AS. *a*, on, and *thwart: on thirt*, an accommodation of Icel. *um-thvert*, across]: across; from side to side: AD. among *seamen*, across the line of the ship's course; in a manner to cross or perplex; from side to side of a ship, in contradistinction to 'fore and aft.'

ATHYMIA, n. *a-thĭ-mĭ'ă* [Gr. *athumia*—from *athumeō*, to be down-hearted—from *a*, without; *thumos*, the soul as the seat of passion]: faint-heartedness; despondency.

ATHYRIUM, n. *ă-thĭr'ĭ-ŭm* [Gr. *a*, without; *thurion*, a little door; a wicket]: genus or sub-genus of ferns.

ATILT, ad. *ă-tĭlt'* [AS. *a*, on, and *tilt*]: in the position of a man making a thrust; in the posture of a barrel raised behind that the liquor may run out.

ATIMY, n. *ăt'ī-mĭ* [Gr. *atimia*, dishonor—from *atimaō*, to dishonor—from *a*, without; *timē*, worship, honor; *tiō*, to pay honor]: in ancient *Greece*, infamy; public disgrace inflicted on those who had been guilty of certain offenses.

A-TIPTOE, ad. *ă-tĭp'tō* [AS. *a*, on, and *tiptoe*]: on tiptoe.

ATITLAN, *â-tē-tlân'* (or ATITAN, *â-tē-tân'*), LAKE: body of water in the dept. of Solola, Guatemala. It is 24 m. long, 8 to 10 m. wide, and a line of 1,800 ft. has obtained no soundings. Several small streams enter it, but it has no visible outlet, and is supposed to occupy the crater of an extinct volcano. Just s. of it are the volcano of A., 12,538 feet high, and the Indian t. Santiago de A. The lake is surrounded by high cliffs devoid of vegetation.

ATKINSON, *ăt'kĭn-son*, EDWARD, LL.D.: political economist: b. Brookline, Mass., 1827, Feb. 10; d. Boston, 1905, Dec. 11. He received his education chiefly in private schools, and from his youth made a specialty of investigating economic subjects, not only political, but also domestic. He was the founder of the Boston Manufacturers' Mutual Fire Insurance Co., whose members were factory owners, agreeing to run their business on a uniform plan and by established rules. A. gave much study to the subject of railroads, their management and their effect on the movement of population and the conditions of trade; and lectured and wrote extensively concerning them. He informed himself thoroughly also on agricultural subjects, and paid attention to household matters, especially cooking. He invented a style of oven or cooking stove, called the *Aladdin Cooker*, which produced a surprising saving in fuel, and concerning which he lectured, accompanying his lectures with experiments. He interested himself in cooking-schools and charity kitchens. Among his more important addresses are *Banking*, delivered at Saratoga 1880 before the American Bankers' Assoc.; *Insufficiency of Economic Legislation*, before the American Social Science Assoc.; *What Makes the Rate of Wages;* and an address on the *Application of Science to the Production or Consumption of Food*, before the American Assoc., 1885. Among his pamphlets and books are *Cheap Cotton by Free Labor* (1861); *The Collection of Revenue* (1866): *Our National Domain* (1879); *The Railroads of the United States* (1880); *Cotton Manufactures of the United States* (1880); *The Railway and the Farmer* (1881); *The Distribution of Products* (1885); and *Taxation and Work* (1892). In 1898 he became vice-president of the Anti-Imperialist League and was actively concerned in sending to the troops in the Philippines certain pamphlets which were characterized as 'seditious' by Gen. Otis and were thereupon excluded from the mails.

AT'KINSON, GEORGE FRANCIS, American botanist: b. Raisinville, Mich., 1854, Jan. 26. He was educated at Olivet College, Michigan, and Cornell University, and

taught general zoology, biology, and entomology in the universities of North Carolina, South Carolina, and the Alabama Agricultural and Mechanical College. He was assistant and professor of cryptogamic botany at Cornell, 1892–6, and professor of botany there since 1896. He has written: *Biology of Ferns; Studies of Plant Life; Studies of American Fungi; College Text-Book of Botany* (1905).

AT'KINSON, John, American clergyman: b. Deerfield, N. J., 1835, Sept. 6; d. Haverstraw, N. Y., 1897, Dec. 8. He entered the Methodist ministry in 1853, and held pastorates in Newark, Jersey City, Chicago, Bay City, Adrian, and Haverstraw. He was the author of the hymn *Shall We Meet Beyond the River*. He wrote: *The Living Way* (1856); *Memorials of Methodism in New Jersey* (2d ed. 1860); *The Garden of Sorrows* (1868); *Centennial History of American Methodism* (1884).

AT'KINSON, John Christopher, noted English clergyman and antiquary: b. Eddhangor, England, 1814; d. 1900. He was for half a century vicar of the parish of Danby in the North Riding of Yorkshire, which he has described in his delightful *Forty Years in a Moorland Parish* (1891). He wrote much on natural history, and his *Walks, Talks, Travels and Exploits of Two School-Boys* (1859); *Play Hours and Half Holidays* (1880); *British Birds' Eggs and Nests* (1861), and *The Last of the Giant Killers* (1891), have been widely read. Other works by him are *A Glossary of the Dialect of the Hundred of Lonsdale*: (1867); *A Glossary of the Cleveland Dialect* (1868); *History of Cleveland* 1872-7).

AT'KINSON, Thomas, American bishop: b. Mansfield, Va., 1807, Aug. 6; d. Wilmington, N. C., 1881, Jan. 4. He was graduated from Hampden-Sidney College, Virginia, in 1825, and practised law for nine years. Ordained priest in the Episcopal Church in 1837, he served as rector in Norfolk and Lynchburg, Va., and Baltimore, Md., whence he was elected third bishop of North Carolina, 1853, May 26. He was an able administrator and prominent in the councils of his Church. He published various sermons and Episcopal charges.

ATLANTA, *ăt-lăn'ta:* city, cap. of Fulton, co., and of the state of Ga.; on the Atlanta and West Point, Central of Georgia, Southern, Seaboard Air Line Western and Atlantic railroads, etc.; 101 m. n.w. of Macon, 171 m. w. of Augusta, 291 m. s.e. of Nashville; popularly known as the 'Gate City.' Its situation is peculiarly advantageous, 1,100 ft. above sea-level, and 7 m. from the Chattahoochie river, a site exceptionally adapted for a great commercial and railroad centre. The city is laid out in a circle 3½ m. in diameter, and its area is 11 square miles.

Owing to Atlanta's central position it has become a business centre for the s.e. states and its commerce is large and growing. Bank clearings increased from

$56,000,000 in 1894 to over $150,000,000 in 1905; and during the same period the bank deposits grew from $4,000,000 to over $13,000,000. The annual postal receipts are about $500,000, and the wholesale and retail trade is over $50,000,000 each year. The annual sale of mules is valued at $7,000,000. The manufactures of A. are important and varied. The 1900 census reported 395 establishments with $16,085,114 capital, 9,368 wage-earners, $3,106,039 total wages, and value of products $16,721,899. It is now (1906) estimated that the products have increased to $21,000,000 and the total wages to $4,000,000 paid to 12,000 workers. The industries include cotton goods, fertilizers, machinery, lumber, street cars, engines, car wheels, agricultural implements, carriages, furniture, sheet-metal work, cigars, paper bags, flour, paints, and varnish, cotton-seed oil, woolen goods, clothing, etc. The factories are well supplied with steam and electric power. Printing and publishing a flourishing industry of Atlanta, the annual postal receipts for second class matter exceeding that of Baltimore, Buffalo, Washington City, Omaha, New Orleans, Louisville, and Indianapolis. The city has an excellent public school system, embracing grammar and high schools, with some 16,000 pupils. There are several business colleges, textile, mechanical, and engineering schools, and several colleges for women. The Georgia Institute of Technology, Clark Univ., Atlanta Univ., Spolman Seminary are located here and there are also a number of institutions for the higher education of the colored youth.

The charities of the city are numerous and well managed. Grady Hospital (supported by the city), St. Joseph's Infirmary (R.C.), Presbyterian Hospital are noteworthy. Atlanta boasts of some fine buildings, among which may be mentioned the Capitol building, completed in 1899, Custom-House, Post-office, County Court House, Chamber of Commerce, Equitable Building, Y. M. C. A., Carnegie Library (containing 20,000 volumes), and a new Union Depot. There are over 100 churches in the city, and the total membership is said to exceed a third of the population. There are 150 miles of street railway, over 100 m. of sewers, 70 m. of paved streets, and 250 m. of sidewalks. The city has many outing resorts, including Grant Park, Piedmont Park (the site of the Exposition of 1895), Lakewood, East Lake, etc. The city departments are well equipped and efficient, and the associations for the encouraging of commerce are numerous and active. The founding of the city was due to its selection as the point of departure for branch roads to Athens, Milledgeville, Columbus, and other cities, from the main line of railroad (the Western and Atlantic) between A. and Chattanooga. It was surveyed and laid out 1844–5, named first Terminus, afterward Marthasville, and 1847,

1. Georgia School of Technology.
2. Carnegie Library.

when incorporated, Atlanta. The first building in A. was a log hut, 1836; the first store was opened 1843; in the same year the first locomotive ran over the new railroad, and until 1864 its growth was continuous. In that year Gen. Sherman, in his famous march to the sea, occupied Atlanta, the inhabitants fled, and the city was occupied by Union soldiers. The occupation lasted until Nov., when the army departing left a mass of smoking ruins. The return of the inhabitants to their devastated homes was the beginning of a wonderful progress. Total debt of A. (1900) was $3,650,733; assessed valuation of property $67,328,640. Pop. (1900) 89,872; (1910) 154,839.

ATLANTES, *ăt-lăn'tēz:* so called by the Greeks in reference to the mythical Atlas (q. v.): male figures used instead of columns. The Romans called them Telamones.

ATLANTIC, a. *ăt-lăn'tĭk,* of or pertaining to the ocean so named.

ATLANTIC: city, cap. Cass co., Iowa, on the Chicago, Rock Island and Pacific r.r., 60 n. e. of Omaha. Notable buildings are the court-house and the high-school. A. has an excellent public school system, a large number of manufacturing establishments, several banks, daily and weekly newspapers. Pop. (1910) 4,560.

ATLANTIC CITY, *ăt-lăn'tĭk:* popular seaside resort in Atlantic co., N. J., 60 m. s. e. of Philadelphia, and 146 m. from New York; on Absecom Beach on a sandy island, 10 m. in length, and abt. ¾ m. in width, which extends between Absecom Inlet and Great Egg Harbor Inlet, and is separated by a narrow strait from the mainland. The beach is considered one of the best and safest on the coast, and the locality is the favorite resort of the citizens of Philadelphia, besides drawing thousands from all parts of the country, during the height of the season. The city is prettily laid out with broad and pleasant avenues. Pop. of city (1890) 13,055; (1900) 27,838; (1910) 46,150.

ATLANTIC OCEAN: that part of the ocean lying between the western coasts of Europe and Africa, and the eastern coasts of North and South America, and extending from the Arctic to the Antarctic seas. Its greatest breadth is between the western coast of North Africa and the eastern coast of Florida in North America, a distance of 4,150 m. If the Gulf of Mexico, in reality one of its bays, be included, it will extend to 5,000 m. Its least breadth, between Norway and Greenland, is about 930 m. Between Cape St. Roque, Brazil, and Sierra Leone, the breadth is 1,730 m. Its superficial extent has been estimated at 25,000,000 square m. From the number and extent of its inlets, gulfs, and bays, its coast lines are of great length, the eastern being upward of 32,000 m., and the western upward of 55,000. Its principal inlets and bays are Baffin and Hudson bays, the Gulfs of Mexico, Honduras, and San Juan, the North Sea or German Ocean, the Bay of Biscay,

and the Gulf of Guinea. The principal islands north of the equator are Iceland, the Faroe, and British islands, the Azores, Canaries, and Cape de Verd islands, Newfoundland, Cape Breton, and the West India islands; and south of the equator, Ascension, St. Helena, Trinidad, Columbus, and Tristan da Cunha, the last three being mere rocks.

Currents.—The great currents of the Atlantic are of two kinds, drift and stream. Drift currents are produced by the wind, either by the perpetual or trade winds, or by prevailing winds. Those having the former origin are constant, running always in the same direction, and generally with a nearly equal velocity; those having the latter are not so constant, neither do they always run in the same direction, nor at a similar rate. The drift currents produced by the trade winds are found between the tropics; those resulting from prevailing winds, north and south of the parallels of 30°. Stream currents are due indirectly to the influence of winds, being produced by drift currents, of which they are continuations. As these currents travel for great distances they meet with many obstacles in their course, which result in changes of direction. A stream current may thus be successively propelled by different currents, or consist in the combination of different stream currents. A third kind of currents is produced by the flow of the water to restore the level disturbed by other currents. This is called a current of indraught. The great currents of the Atlantic are the Gulf Stream, the equatorial current—which may be divided into the main equatorial current, the north equatorial current, and the south equatorial current, the North African and Guinea current, the South connecting current, the Southern Atlantic current, Cape Horn current, Rennel current, and the Arctic current. The equatorial current, so called from its being under the line, commences on the western coast of Africa, about lat. 10° S., or nearly opposite St. Paul de Loando. From this point it pursues a northwest direction till it makes long. 0°, when it proceeds due west on both sides of the equator, till it arrives at Cape St. Roque in South America, when it is divided into two branches, one running along the Guiana coast, and into the Gulf of Mexico, as already mentioned, the other along the coast of Brazil, and so called the Brazil current. The latter is reinforced by the south equatorial current, which, however, is not distinctly separable from the main equatorial current. The length of the equatorial current, from the coast of Africa to Cape St. Roque, is 2,500 m. Its breadth near the commencement is 185 m.; opposite Cape Palmas, 420 m.; and before dividing, about long. 31° or 32° W., it is 510 m.

The Gulf Stream is a continuation of the main equatorial current, and partly of the north equatorial current, both western drift currents produced by the trade winds. The former passes across the Atlantic to the American coast, upon which it strikes from Cape St. Roque to the Antilles. On being turned by the coast it runs along it at a rate of 30 to 50 m. per day, and sometimes at a higher speed, till

it enters the Gulf of Mexico, from which, having previously received part of the waters of the north equatorial current, it issues between Florida and Cuba under the name of the Gulf Stream. It afterward flows nearly parallel to the coast of the United States, separated from it by a belt of cold water. Off Cape Hatteras it spreads into an expanding channel, reaching a breadth of 167 m., and consisting of three warm sections with two cold belts interposed. On passing Sandy Hook it turns east and continues to be recognizable, partly by the blue color derived from the silt of the Mississippi, till about long. 30° W., where, with a greatly diminished temperature, it is found flowing nearly due east. Its average velocity, which is greater in summer than in winter, is from 25 to 30 miles a day. See GULF STREAM. The North African and Guinea current originates between the Azores and Cape Finisterre in Spain. It flows in a southeasterly direction, and after sending a mass of water into the Mediterranean it pursues a southerly course to Cape Mesurada, south of Sierra Leone, keeping at a considerable distance from the land. It then flows rapidly for 1,000 m. due east to the Bight of Biafra, where it seems to mingle with the equatorial current. It is led from the west by the Guinea counter current, a back flow of water between the main and the north equatorial currents. The south connecting current strikes across the South Atlantic from the Brazil current, then turns north, and finally joins the great equatorial current. The South Atlantic or South African current originates north of the Cape of Good Hope, from which it flows in a northwesterly direction, at a rate of from 15 to 30 m. a day, and eventually merges into the equatorial current. Cape Horn current flows constantly from the Antarctic and South Seas into the Atlantic Ocean, its general direction being east-northeast and northeast. Rennel current, which is possibly a continuation of the Gulf Stream, enters the Bay of Biscay from the west, curves round its coast, and then turns northwest toward Cape Clear in Ireland. The Greenland or Arctic current runs along the east coast of Greenland to Cape Farewell; having doubled this cape, it flows up toward Davis Strait, from which it receives an inflow of water, and then turns to the south along the coast of Labrador, and continues along the coast of the United States, from which it separates the Gulf Stream by a band of cold water. In the interior of the North Atlantic there is a large area comparatively free from currents, lying between 20° and 30° N. and 30° to 60° W. It is called the Sargasso Sea, from the large quantity of sea weed which drifts into it. Besides the surface currents, recent investigation has established the existence of a general oceanic circulation, consisting of an under current of cold water flowing from the Poles to the equator, and an upper current of warm water from the equator to the Poles.

Depths.—The greatest depth yet discovered in the Atlantic is to the north of the island of Porto Rico, namely 27,366 ft. Depths of 40,000 to 50,000 ft. were formerly

reported, but recent explorations have shown these reports to be incorrect, probably owing to defective sounding apparatus. The bed of the North Atlantic between Europe and America may be represented as consisting of two great valleys lying north and south, and separated by an intervening ridge. Each of these valleys is about 500 m. in width, the mean depth of the east valley is 14,000 to 15,000 ft., and it can be traced from the equator to the latitude of the Faroes, where it terminates. The west valley has a maximum depth of 16,800 ft. and extends from the latitude of the Azores as far north as Greenland, where it bifurcates, the deeper portion extending north up Baffin Bay. The submarine ridge dividing these two valleys is very uniform in depth below the surface, having 1,600 fathoms of water above it from the Azores to the latitude of the Hebrides. It then rises gradually till it culminates in Iceland. On this plateau the Atlantic telegraph cables have been laid, and from it the first specimens of deep sea mud were brought up. The South Atlantic is not so well known as the North, but so far soundings prove it has not a greater depth than the latter, the greatest depth found being 2,900 fathoms (17,400 ft.) in lat. 28° S. It would appear to be separated from the North Atlantic by a rocky ridge, on which rests the islands of Ascension, Fernando de Noronha, and St. Paul. The saltness and specific gravity of the Atlantic differ in various parts, and gradually diminish from the tropics to the Poles, and also from within a short distance of the tropics to the equator.

ATLAN′TIS: according to ancient tradition, a vast island in the Atlantic Ocean. It is first mentioned by Plato, who represents an Egyptian priest as describing it to Solon, but, of course, according to Plato's view of the matter. In this description, A. appeared as an island larger than Libya and Asia Minor taken together, and lying off the Pillars of Hercules in the Atlantic Ocean. Plato gives a beautiful picture of the interior of this imaginary land, and enriches it with a fabulous history. Some early writers supposed that the Canary Islands were the remains of the old A.; for Plato had stated that at the close of the long contest which its inhabitants maintained against the Athenians, nine thousand years before his time, the sea suddenly engulfed the island, and had ever since been unnavigable, by reason of the shoals of mud created by the sunken island. Some found it in the Scandinavian peninsula; others (first Bircherod, 1685) have supposed the vast island of A. mentioned by Plato, as well as the great unnamed island spoken of by Pliny, Diodorus, and Arnobius, may have been the new world. For curious array of evidence that A. was the scene of the first civilization and the deluge, see *Atlantis*, by Ignatius Donnelly.

ATLAS, n. *ăt′lăs*, ATLASES, n. plu. *ăt′lăs-ĕz* [Gr. *Atlas*, name of a giant who, the ancient Greeks pretended, bore up the earth upon his shoulders]: a collection of maps bound together; the first vertebra or top joint of the neck, or that which supports the head. ATLANTES, n. plu. *ăt-lăn′tēz*, in

arch., the whole or half figures of men employed instead of columns or pillars. ATLANTEAN, a. *ăt'lăn-tē'ăn*, or ATLANTIAN, a. *ăt-lăn'shĭ-ăn*, pertaining to Atlas, or to the isle of Atlantis; strong; gigantic. ATLANTIDES, n. pl. *ăt-lăn'tĭ-dēz* [L. *Atlantides, Atlantiades*]: in *class. myth.*, the daughters of Atlas, seven of whom were called also Pleiades, after their mother Pleione. After their death they were supposed to have been transformed into the constellation Pleiades; in *astron.*, a designation sometimes given to the stars constituting the Pleiades.

'AT'LAS: that piece of the human vertebral column which is nearest to the skull; in other words, it is the first cervical vertebra. It may be known from the other six by its being without a body or spinous process, by its being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the part in front being occupied by the tooth-like process of the second cervical vertebra, and that behind, by the spinal-marrow. On each side, the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra.

The A., with the occipital bone, forms the joint on which the head moves in bowing; and turns on the pivot of the second cervical vertebra, when the head is moved from side to side.

AT'LAS, in Ancient Myth.: according to Hesiod's *Theogony*, one of the Titans, son of Iapetus, and Clymene, bro. of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, states him to have been a son of Asia, and Hyginus, a son of Æther and Gaea. He married Pleone, daughter of Oceanus (or Hesperis, his own niece), and became the father of the Pleiades. As leader of the Titans, he attempted to storm the heavens, and for this supreme treason was condemned by Zeus to bear the vault of heaven on his head and hands—the sting of this mythological punishment obviously being, that A. was compelled to support what he thirsted to destroy. The later writers, however, rationalize the myth, and state that A. was a mighty king who had great skill in astronomy, and only tried to storm heaven intellectually.—In consequence of the ancient views which made the vault of heaven rest on solid pillars or other supports, the name A., originally mythological and cosmogonic, was introduced into geography. Mercator, in the 16th c., gave the name A. to a collection of maps; probably because the figure of A. supporting the heavens had been given on the title-pages of such works.

AT'LAS: a mass of mountain-land in the w. part of n. Africa. Herodotus mentions a smoking mountain of this name situated on the s.w. of the Little Syrtis, twenty days' journey w. from the Garamantes, styled by the natives the 'pillars of heaven.' By later writers, after the time of

Polybius, the name A. was always given to the chain of mountains in n.w. Africa extending from the island of Cerne (now Cape de Ger) n.w. through Mauritania, and Tingitana (now Fez and Morocco), and including also the heights dispersed through the region of Sahara. It is divided into the Little Atlas and the Great Atlas; the former denominating a secondary range in the country of Sous, and the other the loftier mountains of Morocco. The A. is not properly a mountain-chain, but rather a very irregular mountainous mass of land formed of many chains running in various directions, meeting in mountain-knots, or connected by yokes, or short chains of inferior height, and diversified still further by several solitary mountains and groups of mountains. The highest summits, the Miltsin (11,400 ft.), southeast of the city of Morocco, and other mountains near the Wady Oum Erbegh, and the Mulina, are rarely free from snow. The greatest heights of the entire system are the Jebel Ayashi (14,600 ft.) and Tanjurt (14,500 ft.). The most southern chain diverging from the central mass bears the name Jebel-Hadnar. The heights approach the sea, and form the promontories jutting out into the Atlantic. From Morocco, the A. gradually decreases in height towards the e. In Algeria, the elevation is only 7,673 ft.; in Tunis, 4,476 ft.; and in Tripoli, 3,200 ft. The whole mountain system is intersected by the valley of the Muluia river, which flows through the n. e. part of Morocco, and falls into the Mediterranean. The slopes on the n., w., and s. are covered with vast forests of pine, oak, cork, white poplar, wild olive, etc. The valleys are well watered and capable of cultivation with great profit. The A. seems to be chiefly calcareous in its composition. The mineral wealth remains almost wholly unexplored, though copper, iron lead, antimony, etc., are reported to exist in abundance.

ATLASITE, n. *ăt'lăs-īt* [apparently from Ger. *atlas*, satin, named from the satiny or silky character of the mineral. The term corresponds to Ger. *atlaserz*, fibrous malachite]: a mineral believed by Dana to be a possible mixture of azurite and atacamite. It is a copper carbonate that contains chlorine.

ATMIDOMETER, n. *ăt-mĭ-dŏm'ĕt-ėr* [Gr. *atmidos*, genit. of *atmis*, the steam of a fomentation. Cognate with *atmis*]: an instrument still in use, invented by Babington, for measuring the evaporation from water, ice, snow, etc. It consists of two glass or metal bulbs, one of them placed above the other, with which it communicates by a narrow neck. The lower one is weighted with shot or mercury, and the upper has on it a small glass or metal stem, with a scale graduated in grains and half-grains. On the top of all there is a shallow pan. The instrument being immersed in a vessel of water through a circular hole in which the stem rises, distilled water is gradually poured into the pan above, causing it to sink to the point at which the zero of the stem is on a level with the cover of the vessel. As then the water in the pan gradually evaporates, the stem

slowly ascends, the amount of evaporation being indicated in grains on the graduated scale.

ATMOLOGY, n. *ăt-mŏl'ŏ-jĭ* [Gr. *atmos*, vapor; *logos*, discourse]: the science of vapor. AT'MOLOG'ICAL, a. *-lŏj'-ĭ-kăl*, pertaining to the science of vapor. ATMOL'OGIST, n. *-ŏ-jĭst*, one who.

ATMOMETER, n. *ăt-mŏm'ĕ-tėr* [Gr. *atmos*, vapor; *metron*, a measure]: an instrument for measuring the amount of evaporation from any moist surface in a given time: sometimes termed ATMIDOMETER. It was invented by Sir John Leslie, and consists of a very thin ball of porous earthenware, from one to three inches in diameter, having a small neck firmly cemented to a long and rather wide tube of glass, to which is adapted a brass cap with a narrow collar of leather to fit closely. It is filled with distilled or pure water, and its cap screwed tightly. It is then suspended out of doors in a situation where it is exposed freely to the action of the wind, but it is sheltered from rain. As the water evaporates from the external surface of the ball, it transudes through its porous substance, and the waste is measured by the corresponding descent of the liquid in the stem. To test the amount of this descent, there is a finely-graduated scale. When the water has sunk to the bottom of the stem, the latter requires to be filled again. The accuracy of the A. is only approximate.

ATMOSPHERE, n. *ăt'mŏs-fēr* [Gr. *atmos*, vapor; *sphaira*, a sphere]: the whole mass of air, clouds, and vapor surrounding the earth. ATMOSPHERIC, a. *ăt'mŏs-fĕr'ĭk*, or AT'MOSPHER'ICAL, a. *-ĭ-kăl*, pertaining to the air; produced or operated on by the atmosphere. AT'MOSPHER'ICALLY, ad. *-lĭ*. AT'MOSPHER'IC PRESSURE, the weight of the atmosphere on a surface, being about 15 lbs. to the square inch at the level of the sea. ATMOSPHER'IC TIDES, tides that must exist in the atmosphere as in the ocean, from the attractions of the moon and the sun.

AT'MOSPHERE: the gaseous envelope which surrounds the earth, and is commonly called the air. The A. is indispensable to animal and vegetable life, the modifying and retaining of solar heat, the transmission of sound, the gradual shading of day into night, the disintegration of rocks, and the occurrence of weather phenomena. In consequence of the action of gravity, the A. assumes the form of a spheroidal stratum concentric with the earth and presses heavily on its surface. It exhibits, in common with all fluid bodies, the usual characteristics of hydrostatic pressure, but its internal condition differs from that of a liquid inasmuch as its particles repel each other, and can only be held in proximity by external force. From this, it follows that the volume of any portion of air varies much more under the influence of external pressure than that of an equal volume of water; hence, the stratum of air nearest the earth is denser than strata in the upper regions, where, from their being subjected to the weight of a smaller

mass of superincumbent air, the repulsive force of the particles has freer play.

That air has *weight*, is illustrated by the following simple experiment. If a hollow glass globe of five or six inches in diameter be weighed, first when filled with air, then after the air has been extracted from it by means of the air-pump, it will, when thus exhausted, weigh sensibly less than it did before, and the difference of the two results will represent the weight of the quantity of air withdrawn. It has been determined by Biot and Arago that 100 cubic inches of dry air, when the barometer is at 30 inches, and the thermometer at 60° Fahrenheit, weigh 31.074 grains. The law of Archimedes (see ARCHIMEDES, PRINCIPLE OF), that a body immersed in a fluid loses a part of its weight equal to the weight of the volume of fluid displaced by it, finds its application in the A. as well as in water. If a glass globe filled with air and closed be suspended at the extremity of the beam of a delicate balance, and be kept in equilibrium by a brass weight at the other extremity, and if the whole be then placed under the receiver of an air-pump, and the air extracted, the equilibrium previously existing in air will be disturbed, and the larger body will become the heavier. The reason of this is, that when first weighed, they each lose as much of their own weight as that of the respective volumes of air displaced by them, and are therefore made buoyant, though in different degrees, the ball with the larger volume having the greater buoyancy. In a vacuum, they are deprived of this buoyancy, and the larger body, suffering the greater loss, becomes sensibly heavier than the other. In like manner, a balloon filled with heated air or hydrogen gas is lighter than the volume of air displaced by it. It is therefore forced upward until it reaches a stratum of such density that the weight of the volume of air there displaced by it equals the weight of the balloon itself. In this stratum it will remain poised, or move horizontally with the currents to which it may be exposed.

In endeavoring to determine the *form* of the atmospheric envelope, it is necessary to bear in mind that, according to the law of fluid-pressure, in order to produce a state of equilibrium at the level of the sea, the pressure of the A. must be equal at that level over the whole of the earth's surface. Gravity acts with less force on the air at the equator than on that at the poles, in consequence of the spheroidal form of the earth. It has therefore, in addition, to contend with the centrifugal force, which entirely fails at the poles, and which has a tendency to lighten the air by acting contrary to gravity. Hence we infer, that, in order to produce the same pressure at the level of the sea, the atmospheric height at the equator must be greater than that at the poles, and that the A. must therefore possess the form of an oblate spheroid, whose oblateness is considerably greater than that of the earth itself. The greater heat at the tropical regions must also have the effect of increasing the oblateness.

The *height* of the A. has not yet been determined. That it must have a certain limit, is evident from the consideration that there must be a point at which gravity on the one hand, and centrifugal force and the repulsive action of the particles on the other, are poised, and beyond which —the latter forces overbalancing the former force—the aerial particles would be borne away from the earth. As, however, the law of the diminution of temperature, which materially affects the repulsive action, is unknown for the upper regions of the air, it is impossible to calculate the height of the atmosphere from the relations of these forces. From the observation of luminous meteors, it is inferred that it is at least 100 m. high, and that, in an extremely attenuated form, it may reach 200 m.

The *pressure* of the A. is one of its most important properties. Its effect is exhibited in the action of the ordinary water-pump. The piston is fitted air-tight in its cylinder, and on being drawn up creates a vacuum. The water within the pump, being thus freed from pressure, while that outside of it is exposed to the pressure of a column of air reaching to the surface of the A., is at once forced up by reason of the weight of air which it must rise to balance. The ascent of the water takes place until the piston has reached the height of nearly 34 ft., from which we conclude that a column of air is equal in weight to a column of water of the same horizontal section, and of the height of nearly 34 ft. As mercury is 13.6 times heavier than water, a mercurial column freed from atmospheric pressure at the one extremity, and subjected to it at the other, is 13.6 times less in height than the column of water, or about 30 inches. From the more convenient size of this column, mercury has been adopted as the standard for atmospheric pressure, and is employed in ordinary barometers (q. v.). A mercurial column 30 inches in height and 1 square inch in section weighs 15 lbs. (more accurately 14.73), which gives the equivalent weight of a column of atmospheric air of the same section.

The word A. is often employed to express this weight or pressure on a sq. inch of surface, so that when we speak, in Mechanics, of the pressure of steam on a boiler as amounting to three atmospheres, we mean a pressure of 45 lbs. on the sq. inch. The pressure of the A. on a sq. inch being thus ascertained, we have merely to multiply it by the number of sq. inches on the earth's surface to obtain the total weight of the A. It amounts to 11.67085 trillions of lbs. or about $\frac{1}{18800000}$ of the earth's mass. It must be observed that the height of the barometric column is not a constant quantity, as it varies with the latitude, the season of the year, and the hour of the day. At London its mean height is 29.88 inches; at Paris, 29.92 inches. The pressure of the A. in the northern hemisphere increases as we recede from the equator, reaching a maximum at 30° n. lat., and decreasing from 30° to 65°, where it again begins to rise. The greater height at 30° is said to be due to the accumulation of air at that latitude by the action of the trade-winds.

As the heat of the earth's surface increases the rarity of the air above it, and causes the air at the top of the heated column to overflow, it would be expected that, during the year, the barometer would stand at a minimum in summer, and a maximum in winter. In reality, however, though the barometer is highest in mid-winter, there is another maximum in mid-summer, making thus two minima—one in spring, the other in autumn. This arises from the part borne by watery vapors in the pressure of the atmosphere. The heat of mid-summer introduces into the air a large quantity of moisture, in the form of elastic vapor, which, adding its pressure to that of the dry air, raises what would otherwise be the minimum barometric column to a higher point than that at which it stands in spring and autumn. Similar causes affect the pressure of the A. during the 24 hours of the day. There are two maxima—one at 10 A.M., the other between 10 and 11 P.M.; and two minima—at 4 A.M. and 4 P.M. Very slight variations indicate the existence of atmospheric tidal waves; but this subject is still obscure. The pressure of the A. exercises a most important influence on the organism of the human frame. A man of ordinary stature is exposed to a pressure of about 14 tons; but as the air permeates the whole body, and presses equally in all directions, no inconvenience is found to result from it. From experiments instituted by the brothers Weber in Germany, it has been ascertained that the heads of the thigh and arm bones are kept in their sockets by the pressure of the A.; and in balloon ascents the aeronaut often suffers from bleeding at the nose, lips, and even eyes—a fact that would seem to indicate that the strength of the blood-vessels has been adjusted with reference to atmospheric pressure.

Chemical Composition of the A.—Recent chemical researches give the following as the mean composition of normal air:

	Volumes.
Nitrogen	76.95
Oxygen	20.66
Carbonic acid	0.034
Aqueous vapor	1.4
*Argon	0.94
Hydrogen	0.019
Ammonia	0.0008
Ozone	0.00015
Nitric acid	0.00005

*The other four gases of the argon group taken together come to 0.0012.

Roughly speaking, then, dry air may be said to consist of 4 volumes of nitrogen and 1 of oxygen, with a slight admixture of carbonic acid, and a mere trace of several other substances. As, however, the air of the A. is never found dry, we must add to the constituents already named watery vapor, the amount of which is constantly changing, according to locality, weather, wind, and temperature. It is stated that of 1,000 grains of atmospheric air, the

proportion due to aqueous vapor varies from a minimum of 4 to a maximum of 16 grains. By far the most active chemical constituent of the A. is oxygen, essential to the existence of animal life, the maintenance of combustion, the rusting of metals, and the occurrence of many other chemical phenomena. A small portion of this oxygen occurs in the form of ozone (q. v.), a modification which, according to recent chemical discoveries, is important in the chemistry of the A. The nitrogen which forms the bulk of the A. has few chemical properties of importance, but performs the important part of diluting the oxygen, which, if it occurred alone, would act with too great intensity. The presence of carbonic acid in the air is shown by the production of the white carbonate of lime in lime-water freely exposed to its influence. Carbonic acid is produced in all processes where carbonaceous matter unites itself with the oxygen of the air, such as in animal respiration, in combustion, in fermentation, in putrefaction, and similar processes. The green leaves of plants, on the other hand, possess, in presence of sunshine, the power of decomposing carbonic acid into its elements, absorbing the carbon for their own tissues, and restoring the oxygen to the A. in its original purity. Between the processes above mentioned, on the one hand, and the action of plants on the other, the quantity of carbonic acid in the air is kept nearly constant. From the table it will be seen that 10,000 volumes of atmospheric air contain four volumes of carbonic acid. If it occurred in a much larger proportion, being poisonous, it would become dangerous to animal life; and if it occurred in a much less proportion, the vegetable world would lack its requisite nourishment. The other substances, of which traces are always or only sometimes found in atmospheric air, are difficult to detect in the air itself, but are generally found dissolved in rain-water, more especially in that which has fallen immediately after a long drought. Of these, by far the most important and widely diffused are ammonia and ammoniacal salts, which are of essential importance to the vegetable economy, because, dissolved in the rain, they furnish plants with the nitrogen required by them for the production of their flowers and fruit. Nitric acid is detected in the air after thunder-storms, sulphuretted hydrogen in the tainted air of sewers and such like places, and sulphurous and sulphuric acid only in the neighborhood of chemical or smelting works. A considerable quantity of carbonic oxide and carburetted hydrogen escapes unconsumed from our furnaces; and although the latter gas is in addition given off to the air in marshy and bituminous districts, the two occur in almost inappreciable quantity in the atmosphere.

In addition to its gaseous constituents, the A. contains solid substances in a state of exceedingly fine division, the presence of which is revealed in the sunbeam. Many of these minute particles, being the seeds or germs of plants and animals, must exert an important influence on the organic substances on which they may finally settle, in-

ducing in many of them the conditions of disease or putrefaction.

When the composite nature of the A. was first discovered, it was supposed to be a chemical combination of nitrogen and oxygen, but further inquiries have rendered this opinion highly improbable. When any two bodies unite with each other chemically, the substance which results from their combination invariably possesses properties which the original constituents did not possess. Now the atmospheric union of oxygen and nitrogen is distinguished by no properties which may not be attributed individually to these gases. We have, then, in this respect, no indication that the atmospheric combination of oxygen and nitrogen is a chemical one. Again, when any composite gas is dissolved in water, the proportion of the ingredients dissolved in it is exactly the same as that in which they occur in the compound itself; but this is not the case with air dissolved in water, which is found to be richer in oxygen than atmospheric air. Now, as oxygen dissolves more readily in water than nitrogen, it is manifest that this larger proportion of oxygen arises from both gases acting independently of each other in respect to the water, a condition that would be impossible if they were in chemical union. From these and other corroborative facts, the A. is considered to be simply a mechanical combination of the gases contained in it. The various gases of the atmosphere are maintained in a state of uniform mixture notwithstanding they have widely different densities by the operation of two causes: first, air currents that effect the rapid removal of large masses of air from place to place; and second, their own molecular movements which bring about the phenomena of gaseous diffusion.

ATOM, n. *ăt′ŏm* [L. *atŏmus:* Gr. *atŏmos,* indivisible—from Gr. *a,* not; *temno,* I cut]: a particle of matter that cannot be made smaller; anything extremely small; the smallest quantity of an element which can enter into combination—as distinguished from a *molecule,* consisting of two or more atoms. ATOMED, a. *ăt′ŏmd,* small as atoms. ATOMIC, a. *ă-tŏm′ĭk,* or ATOM′ICAL, a. *-ĭ-kăl,* relating to atoms; consisting of atoms. ATOM′IC HEAT, term introduced by M. Regnault. The atomic heat of the elements in a solid state is nearly a constant quantity, the mean value being 6.4. This number is obtained by multiplying the specific heat of an element by its atomic weight. The atomic heat of an element represents the quantity of heat that must be imparted to or removed from atomic proportions of the several elements, in order to produce equal variations in temperature. ATOM′ICALLY, ad. *-lĭ.* ATOMIST, n. *ăt′ŏ-mĭst,* one who holds to the doctrine of atoms. ATOMIZE, v. *ăt′ŏ-mīz′,* to reduce to atoms. AT′OMIZER, n. an instrument used for reducing a liquid into spray. AT′OMI′ZING, inp. ATOMIZED, pp. *ăt′ŏ-mīzd′.* AT′OMLESS, a. ATOMISM, n. *ăt′ŏ mĭzm,* or ATOM′ICISM, the doctrine of atoms. ATOMICITY, n. *ăt′ŏm-ĭs′ĭ-tĭ,* the power with which the atoms of one body can combine with the atoms of another. AT′OMICITIES, plu. *-ĭ-tĭz.* ATOM′IC THE′ORY, in

chem., the supposed resolution of bodies into ultimate particles or atoms, and the relative proportions in which they combine to form compound substances. ATOMY, n. *ăt'ŏ-mĭ*, an atom; an abbreviation for 'anatomy.'

AT'OM. an indivisible particle. In ancient philosophy, two theories of the nature of matter were recognized, and these have continued to form subjects of argument among speculative men since B.C. 510. One theory is, that matter is infinitely divisible. Thus, a needle may be divided into two, and each of the parts may in its turn be broken or cut into two, and each of the latter again and again be subdivided, till the parts become so small that it may be impossible to see them by the naked eye; but these parts are regarded as capable of still further division, without limit or stoppage, provided more perfect or delicate means could be employed to act upon them. The second theory regarding the constitution of matter is, that in the repeated division and subdivision of a solid, liquid, or gas, a point will be reached at length when it will no longer be possible, by any conceivable means, to break a molecule in two, the molecule being a real unity, not composed of separable parts—in other words, an *atom*. The latter theory recognizes the finite divisibility of matter, and considers that all matter is more or less compactly built up of myriads of atoms aggregated together, and having spaces or pores between the several atoms or particles. If it were possible to subject such matter to the scrutiny of a sufficiently powerful magnifying-glass, or microscope, and thus exhibit or behold the atoms so separated by spaces, then an appearance would be presented similar to that which the painter chooses to depict on the canvas when he is representing a snow-storm, and where every little flake of snow is separated from its neighbor one by a space in which there are none; or that which would be observed if, during a hailstorm, some great power were to cry, 'Halt!' and that instant every minute hailstone was arrested in the spot it had reached.

This view of the physical nature of matter, known as the *atomic* or *corpuscular theory*, has in modern times received some support from the facts embodied in the chemical atomic theory originated by Dalton. Granting, however, that the chemist can prove that his simple and compound forms of matter are built up of chemical atoms, the problem still remains to be solved as to the possible identity of physical and chemical atoms. What the chemist regards as an A. in his science, may not be an ultimate and indivisible A. in a physical point of view; the chemical A., though incapable of division as a chemical A., may still be composed or built up of many physical atoms, and may be capable of being subdivided into such. Indeed, while the atomic theory of Dalton, when first announced, was eagerly seized upon as the best possible evidence for the existence of both chemical and physical atoms, the tendency of recent researches and discussions in chemistry has been to show that the chemical A. is

different from the physical, and does not necessitate the existence of the latter. See ATOMIC THEORY. According to the ordinary acceptation of the term, the chemical A. is a molecule of matter having a definite weight, magnitude, and form, possibly alike for the atoms of the same material, but differing in those of different substances. The form of an A. is supposed by some men of science to be the same as that which the fragments of a substance assume when it is split in the direction of the planes of the cleavage of its crystals (see CRYSTALLOGRAPHY); but a more general belief has been, that all atoms are spherical, and that the various crystalline forms are produced by the manner in which the atoms are grouped together. In regard to the size of atoms Sir William Thomson has shown, by three entirely different trains of argument from observed facts, that the diameter of an A. cannot be greater than $\frac{1}{5000000}$, nor less than $\frac{1}{500000000}$ of an inch. See MATTER: VORTEX.

ATOMIC THEORY, in Chem.: a theory as to the ultimate constitution of material bodies. The term was first applied to a theory of Lucretius, following Epicurus and Democritus, who taught that matter is composed of small, indivisible particles, but in its modern form the A. T. was first advanced by Dalton in 1807. It is the most fruitful hypothesis that has ever been put forward in the science of chemistry because it has inspired the greatest number of investigations. Moreover, it harmonizes and co-ordinates a larger number of facts than any other theory which has been advanced. Still, it must be remembered that it is a *hypothesis*, it can never be 'proved,' in the ordinary sense of the term, any more than a proposition in geometry can be 'proved.' Possibly, in the future, a better and truer conception may be presented, but at present it is safe to say that no facts are known in chemistry which cannot be readily expressed in terms of the A. T. Provided its hypothetical nature be clearly understood it can do no harm, and its usefulness and convenience are beyond question. The A. T. is based essentially on the following facts: (1) CONSTANCY OF COMPOSITION. A given compound is invariably found to be composed of the same elements always united in it in the same proportion by weight. Thus, water, which consists of oxygen and hydrogen, does not contain one or both of these elements in indefinite amount, but it is invariably composed of 8 parts by weight of oxygen to 1 part by weight of hydrogen. It makes no difference whether the total amount of either element be represented by grains, ounces, pounds, or tons, it will always be found that the proportion of 8 parts of oxygen to 1 part of hydrogen is maintained. Neither does the source of the water make any difference, for pure water obtained from rain, snow, or hail, the river or the sea, the sap of plants or the juices of animals, invariably contains the same elements in the same proportions. Again, common salt (sodium chloride), whether it be obtained from sea-water, salt-springs, rock-salt, or the blood of animals, always consists of chlorine and sodium

in the exact and never-varying proportion of 35½ parts of chlorine to 23 parts of sodium. Nevertheless, it does not necessarily follow that the same elements or components, in the same proportions, will invariably form the same compound body. It is far otherwise; and many examples can be given, especially from organic chemistry, where the same components in the same proportions produce very different substances. Thus, starch and cotton—very dissimilar substances—consist of carbon, hydrogen, and oxygen in the very same proportions; and gum-arabic and cane sugar are similarly circumstanced. See ISOMERIC BODIES.

In examining the proportions in which elements combine we are at once struck by the constant recurrence of the same members in connection with the same elements. Thus 1 part by weight of hydrogen unites with 35½ parts of chlorine, with 80 of bromine, or 126½ of iodine. The same weight of chlorine, 35½ parts, unites with 23 of sodium, 39 of potassium, or 20 of calcium, and the same weight of each of the three metals unites with 80 parts of bromine or 126½ parts of iodine. This suggests at once that there is a limit below which we cannot divide these elements. In fact, it closely resembles the state of things found in shopping. The various articles are priced at so many cents, never in fractions of a cent. Hence we find that, although we can easily *imagine* something sold for ⅕ or ⅐ of a cent, yet *practically* we can never buy anything for less than 1 cent. A more extensive acquaintance with compounds shows us that the numbers given above do not always apply. Thus hydrogen and oxygen in the ratio 1:8 form water, but in hydrogen peroxide they are present in the proportion 1:16. Chlorine and iron form two compounds, in one 56 parts of iron are united to 71 of chlorine, while in the other 106.5 parts of chlorine are present in combination with 56 of iron. These larger numbers are, however, always found to bear a *simple relationship* to the smaller ones. Thus, in the above examples $8:8\times2$ in the case of oxygen and $35.5:35.5\times2$ and 35.5×3 in that of chlorine. This behavior is often called the LAW OF MULTIPLE PROPORTIONS. Somewhat similar regularities are observed when gaseous substances react. They may be expressed by saying that when gases react the initial *volume* bears a simple relation to the final *volume*, provided that the substance formed is a gas, and that all measurements are made under the same conditions of temperature and pressure. We cannot, however, tell beforehand what this relationship will be. A few examples will make the matter clear. Hydrogen and oxygen unite in the proportion of 2 vols.: 1 vol. and form 2 vols. of *steam*. Two vols. of ammonia are formed from 3 vols. of hydrogen and 1 vol. of nitrogen. One vol. of oxygen unites with carbon to form 1 vol. of carbon dioxide. Dalton's theory was an attempt to explain these regularities. It assumes that each elementary substance consists of extremely small indivisible particles or atoms; that the atoms of

any one element are all exactly alike, but differ from the atoms of every other element. Among other points of difference, they differ in weight, and although the absolute weight of an atom is unknown, the weights of two atoms, one of one element, the other of another element, are in the proportion of the combining weights of the respective elements. Thus the combining weight of sulphur is twice that of oxygen; the atom of oxygen is 16 times as heavy as that of hydrogen and so on, although the absolute weight of an atom of either is not known. Emphasis should be laid on the fact that the above weights and volumes are obtained as the result of the most careful experimental work and they are wholly independent of any theory. The atomic hypothesis is an attempt to explain them; whether we accept or reject it *they* will remain and will have to be accounted for. The question of *relative* and *absolute* weights sometimes presents a difficulty which the following illustration may help to overcome. Suppose one have a pair of scales and a quantity of small shot and be required to weigh a number of objects A, B, C, etc. It is obvious that this could be done easily and the results could be expressed by saying that A = 1000 shot, B = 800 shot and C = 500 shot. The results could, however, be stated equally accurately, and for some purposes more conveniently, by saying that their weights were 10.8 and 5, or 1, 0.8 and 0.5, or 2, 1.6 and 1, but in no case could the weight be given in lbs. or oz. So with the atoms, their relative weights can be determined with a high degree of accuracy, but only a very rough approximate calculation can be made of their absolute weight or of their size. A further question now arises which may be illustrated by the following example: One part by weight of hydrogen combines with 8 parts of oxygen to form water, but with 16 parts of oxygen to form hydrogen peroxide; what is the atomic weight of oxygen? Is it 8 or 16? If the former, then water contains one atom of each element and has the formula HO and hydrogen peroxide contains one atom of hydrogen and 2 of oxygen with the formula HO_2. If, however, the at. wt. of oxygen be 16, then water consists of not less than 2 atoms of hydrogen to 1 of oxygen with the formula H_2O, while hydrogen peroxide contains at least 2 atoms of each element, and, therefore, it must be formulated H_2O_2. As a fact, for many years there was no means of deciding this point and chemists differed greatly, some employing one formula and some the other. The answer to the question was given by Avogadro in 1811, although, on account of experimental difficulties, it was not generally applied and recognized until about 60 years later. The simplicity of the volume relations of gases in chemical reactions has been stated above. All gases expand and contract alike, for similar changes of temperature and pressure (Laws of Boyle and Charles). It is obvious that, in a given volume, different gases must contain the same number of particles (molecules), or a dissimilar number. If the latter, why should they behave in the

same manner? The more probable hypothesis is that *in equal volumes of gases*, under identical conditions of temperature and pressure, *there are the same number of particles* (molecules). This is AVOGADRO'S HYPOTHESIS. If it be accepted it follows that the relative weights of such equal volumes of gases must be the relative weights of their molecules, because all the molecules of any particular gas must be alike in composition and, therefore, in weight. The weight of 100 similar bullets of wood must bear the same relation to that of 100 bullets of lead, if these latter be all alike, that 1 bullet of wood bears to 1 bullet of lead. If, then, we compare the weight of any gas with the weight of the same volume of hydrogen, we have the relative weight of its molecule compared with that of hydrogen. In this way it is found that oxygen is 16 and carbon dioxide 22 times as heavy as hydrogen. The *molecule* of hydrogen is, however, composed of at least 2 atoms (see MOLECULAR WEIGHT), therefore, its density, which is 1, must be multiplied by 2 and so must the other densities; this gives us 2, 32, and 44 as the *relative weights of the molecules* of hydrogen, oxygen and carbon dioxide, respectively. In order to determine the atomic weight of an element it is necessary to determine the relative weights of the molecules of as many of its compounds as possible and then find, by analysis, the *smallest quantity* of the element in question which occurs in the molecule of any of its compounds; this quantity is the *atomic weight*. Thus, in the above examples of water and hydrogen peroxide, the relative weights of the molecules of each are 18 and 34, respectively. The quantity of oxygen in 18 parts of water is 16 and in 34 of hydrogen peroxide 32, obviously, then, 16 is the atomic weight of oxygen and the correct formulæ for the two compounds are H_2O and H_2O_2, respectively. The atomic weights of all the other elements have been determined in a similar manner. It will be seen from the above that, by the help of Avogadro's hypothesis, we can select the correct number out of two or more possible ones with which analysis furnishes us. The *exact number* can only be obtained by the most skillful analysis, however, because the experimental methods of determining the relative densities of the molecules, are much less accurate than analytical methods. By the former we can decide whether the at. wt. of oxygen be 16, 32, or 48, but analysis alone is competent to establish whether it be 16 or 15.89, for example.

ATOM'IC VOLUMES: the volume in cubic centimeters occupied by the quantity of an element, in the liquid or solid state, represented by its atomic weight in grams. It is obtained by dividing the specific gravity by the atomic weight. Thus the sp. gr. of magnesium = 1.75, its at. wt. = 24.5, therefore its at. vol. = 14. see ATOMIC THEORY: CHEMISTRY.

ATOM'IC WEIGHTS: the proportions by weight in which the various elementary substances unite together. It is necessary that one element be selected as the starting-point of the series, and an arbitrary sum affixed to it, and

thereafter all the other elements can have their sums awarded to them, according to the proportional amounts in which they combine with each other. Under the ATOMIC THEORY (q.v.), is explained the manner in which this can be done. The atomic weight of hydrogen is often taken as unity, and the atomic weights of the other elements are then found by analysis and a knowledge of the molecular weights of compounds (q.v.). Thus if it be known by analysis that water is composed of 2 parts of hydrogen and 16 parts of oxygen by weight, and that the molecular weight of water is 18, then it follows, in terms of the atomic theory, that there must be at *at least* 2 atoms of hydrogen, at. wt. = 1, and *at least* 1 atom of oxygen, at. wt. = 16, in the molecule of water. There might, however, be more than 1 atom of oxygen. This point can only be decided by analyzing as many compounds of oxygen as possible and determining their mol. wts. If in all of these we find never more than 16 parts by weight of oxygen in any one molecule of a compound, then 16 is taken as the atomic weight of oxygen. The same line of reasoning and experiment is adopted in the case of the remaining elements. There are several reasons for adopting 1 as the at. wt. of hydrogen, the chief being that it is the lightest known element and should, therefore, logically have the smallest at. wt. Practically, however, it is sometimes more convenient to adopt oxygen = 16 as the unit because it combines with many more elements than does hydrogen. It should be understood that the number 16 is wholly illogical and is simply used because it is more convenient *practically*, at least to the present generation of chemists who have been trained under the hydrogen = 1 system. In the following table the number of figures after the decimal indicates the approximate accuracy with which the atomic weight has been determined. This varies greatly. In the other parts of this work where at. wts. are used, as a rule, the rounded whole numbers are employed for the sake of simplicity. The figures in the table are based on O = 16. The names in parenthesis are the Latin names of the elements from which the symbols are derived.

ELEMENTARY SUBSTANCES, WITH THEIR SYMBOLS AND ATOMIC WEIGHTS.

NAME OF ELEMENT.	SYMBOL.	ATOMIC WEIGHTS. O-16
Aluminium	Al	27.1
Antimony (Stibium)	Sb	120.2
Argon	A	39.9
Arsenic	As	75.0
Barium	Ba	137.4
Bismuth	Bi	208.0
Boron	B	11.0
Bromine	Br	79.96
Cadmium	Cd	112.4
Cæsium	Cs	132.9
Calcium	Ca	40.1
Carbon	C	12.0
Cerium	Ce	140.25

ATOMIC WEIGHTS.

ELEMENTARY SUBSTANCES, WITH THEIR SYMBOLS AND ATOMIC WEIGHTS—Continued.

Name of Element.	Symbol.	Atomic Weights. 0-16
Chlorine	Cl	35.45
Chromium	Cr	52.1
Cobalt	Co	59.0
Columbium	Cb	94.0
Copper (Cuprum)	Cu	63.6
Erbium	Er	161.0
Europium	Eu	152.0
Fluorine	F	19.0
Gadolinium	Gd	156.0
Gallium	Ga	70.0
Germanium	Ge	72.5
Glucinum (Beryllium)	Gl	9.1
Gold (Aurum)	Au	197.2
Helium	He	4.0
Hydrogen	H	1.008
Indium	In	115.0
Iodine	I	126.97
Iridium	Ir	193.0
Iron	Fe	55.9
Krypton	Kr	81.8
Lanthanum	La	138.9
Lead (Plumbum)	Pb	206.9
Lithium	Li	7.03
Magnesium	Mg	24.36
Manganese	Mn	55.0
Mercury (Hydrargyrum)	Hg	200.0
Molybdenum	Mo	96.0
Neodynium	Nd	143.6
Neon	Ne	20.0
Nickel	Ni	58.7
Nitrogen	N	14.01
Osmium	Os	191.0
Oxygen	O	16.0
Palladium	Pd	106.5
Phosphorus	P	31.0
Platinum	Pt	194.8
Potassium (Kalium)	K	39.15
Praseodymium	Pr	140.5
Radium	Rd	225.0
Rhodium	Rh	103.0
Rubidium	Rb	85.5
Ruthenium	Ru	101.7
Samarium	Sa	150.3
Scandium	Sc	44.1
Selenium	Se	79.2
Silicon	Si	28.4
Silver (Argentum)	Ag	107.93
Sodium (Natrium)	Na	23.05
Strontium	Sr	87.6
Sulphur	S	32.06
Tantalum	Ta	181.0
Tellurium	Te	127.6
Terbium	Tb	159.2
Thallium	Tl	204.1
Thorium	Th	232.5
Thulium	Tm	171.0
Tin (Stannum)	Sn	119.0
Titanium	Ti	48.1
Tungsten (Wolfram)	W	184.0
Uranium	U	238.5
Vanadium	V	51.2
Xenon	Xe	128.0
Ytterbium	Yb	173.0
Yttrium	Yt	89.0
Zinc	Zn	65.4
Zirconium	Zr	90.6

ATONE, v. *ă-tōn'* [from *at one*, denoting to be, or to cause to be, at one]: to turn again from the wrong to the right; to agree; to make amends; to give satisfaction for an offense or a crime; to expiate by sacrifice; to reconcile; to appease. ATON'ING, imp.: ADJ. making amends or satisfaction. ATONED, pp. *ă-tōnd'*. ATONEMENT, n. *ă-tōn'-mĕnt*, reconciliation after enmity; satisfaction; expiation; an expiatory sacrifice. ATON'ER, n. one who.

ATONEMENT, in Theol.: (expressed in Hebrew by *Kaphar*, to cover over sin, hence to forgive; Greek *Katalloge*, reconciliation, as usually rendered), the satisfaction offered divine justice, for the sins of mankind, by the obedience, sufferings and sacrificial death of our Lord and Saviour Jesus Christ, by virtue of which all penitent believers in Christ are reconciled to God, and freed from the penalty of sin. Sin violates the ground of union which the personal creature has, by nature, with the holy God. The act of sin is one of separation; the act begets the state of sin, the state confirms and repeats the act. Hence man is a sinner. He is born in sin, lives at variance with God, and in need of reconciliation.

Violated law demands satisfaction. God is just and holy, as well as merciful and gracious. He cannot, without doing violence to his character and moral government, pardon the sinner, because he repents, nor remit his transgressions by the exercise of his sovereignty, because it is not the will of God that any should perish, he has provided the man Jesus Christ to be the propitiation for the sins of the whole world. The doctrine of the A. plainly sets forth how the righteous God can 'be just, and be the Justifier of him which believeth in Jesus.' The doctrine of the A. treats of the mediation necessary for restoring the union between God and man, which has been lost by sin. The A., therefore, must ever be the fundamental doctrine in every religion of sinful creatures. In the Christian religion, it manifestly occupies this central position; for the Christian doctrine of the A. is but the explanation of its great historic fact—the embodiment in one person of the divine and human natures in perfect agreement. In the person of Christ, God and man are atoned or made to be *at one:* Christ is their Atonement.

So fundamental is the doctrine of the atonement in the Christian religion, that it does not, like many other doctrines, form a ground of distinction among the great bodies into which the Christian world has been divided. All historic churches may be said to be equally orthodox on this point. The Roman Catholic Church, the Greek Church, the various Protestant denominations, with the exception of some small sects, all agree, taking their standards, as a criterion, in resting the sinner's hope of salvation on the mediatorial work or atonement of Christ Jesus.

The main differences between Protestants relate to the 'extent' of the atonement; Calvanists maintaining that the sacrificial offering made by Christ was in expiation of the sins of the elect only; Arimineans maintaining that it

was for the whole human race. Nevertheless, there have been from the beginning of the speculative Christian theology, and continue within the several churches, various ways of conceiving and explaining the exact nature and mode of operation of this mediatorial work. What follows is a brief sketch of the historical development of the doctrine of the A. and of these speculations.

Christianity differs from heathenism in the clear perception which it has of the antagonism that sin has introduced between God and man. Heathenism but vaguely conceives of this variance, and consequently has but an ill-defined notion of the atonement required, the notice seldom containing more than the idea of a reconciled union of the individual man with nature and the universal life. Even where its mythical divinities assume personality, it is but an ideal personality without any concrete reality of life, and consequently without any real significance for the conscience. In this state the abject subjection of man to outward nature, or to the visible system of things, prevents his rising into that sphere of conscious freedom which shows sin sinful, and demands an A. with one who is Lord both of nature and man.

In Judaism, man stands above outward nature, in conscious relation to a personal God, whose written law exhibits the requirements of his relationship with man —requirements which are never met, and which only make him fearfully conscious of the ever-widening breach between him and his God. Thus the law awakened the sense of guilt, and the desire for an A.; a desire that it could never satisfy. The never-ceasing demands of these ever-unfulfilled requirements were constantly acknowledged by its whole sacrificial *cultus*, which expressed the hidden ground of Jewish hope, and prophetically pointed to its future manifestation.

But though the Holy Scriptures, throughout the Old Testament, exhibit the making of an A. by vicarious sacrifice (Lev. xvi. 21; xvii. 11); and though the idea, both of the suffering and the deliverance of many by the sins and virtues of one, was common to all antiquity, the idea of the suffering and vicarious Messiah, plainly declared in the writings of the prophets (Luke, xxiv. 46; Isaiah, liii.; Psalm xxii.), and not entirely hidden from the more thoughtful and devout contemporaries of Jesus (Luke, ii. 34; John, i. 29), was foreign to the Messianic faith of the great body of the people.

In the New Testament, Christ is everywhere exhibited as one sent from God for the salvation of the world (John, iii. 16, 17); and as the conditions, on the part of man, of his obtaining this salvation, we read of the requirement of repentance, faith, and reformation (Matt. iv. 17; v. 3, 11; vi. 12; Mark, xvi. 16; Luke, xv. 11), while on the part of God, as conditioning and mediating his forgiveness of sins, we have exhibited the entire life of Christ upon earth conceived of as embracing severally its individual features (Acts, v. 31; Rom. iv. 25; viii. 34); but more especially his

death as a ransom for our sins (Matt. xx. 28; xxvi. 28), as a vicarious sacrifice (1 Peter, i. 19; 2 Cor. v. 21), by which we are redeemed from the bondage of sin (1 Tim. ii. Gal. iii. 13; 2 Peter, ii. 1), and obtain forgiveness (Rom. v. 19; 1 Cor. xv. 3; 1 John, i. 7), and eternal life and peace with God (John, x. 11, Col. i. 20). Christ is therefore the Mediator between God and man (1 Tim. ii. 5), having made peace through the blood of his cross (Col. i. 20); the propitiation for our sins (1 John, ii. 2; iv. 10); and our high-priest who offers himself a sacrifice to reconcile us with God (Heb. ii. 17; v. 1; ix. 28).

In the authorized version of the Old Testament the word atonement occurs not less than 58 times, and once in the margin, all but five of the places in which it is found being in the Pentateuch. It signifies expiation of sin by means of a typical sacrifice; the removal of a sacrificial offering of a ceremonial impurity; a ransom; and a thank-offering. In the New Testament the word occurs but once.

In accordance with this full and explicit teaching of Holy Scripture, we find that the sufferings and death of Christ were ever regarded as of primary and essential importance in his work of redemption; notwithstanding, we look in vain through the early centuries of the Christian Church for anything like a systematic development of the doctrine of the Atonement. The germs of the doctrine existed, but without any logical connection or clearness. While acute thinkers and great theologians waged relentless warfare over other distinctive doctrines of the Church, the atonement, the great central fact in the scheme of human redemption, was so universally accepted as fundamental that its nature and mode of operation elicited little discussion. It was to the Church simply the centre of radiation, from which emanated reconciliation, justification, regeneration, sanctification, salvation, happiness and heaven, and all the Christian graces. It was the *fact* of the A. in Christ that was made prominent and central. The early church fathers dwell with a sort of inspired devotion upon those facts of the gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they seldom attempt to show *how* these blessed results connect themselves with the sufferings and death of Christ; neither do they show in what manner the A. has objectively been made, nor how it is brought to the experience of its individual subjects.

In many ways the sufferings and death of Christ were regarded in relation to their A. for sin. During the first four centuries there appeared no certainty of opinion as to whether they were a ransom price paid to God or to the devil. The latter supposition was the more prevalent, shared by Origen and St. Augustine. Gregory of Nyssa explains this opinion by saying that the devil consented to receive Jesus as a ransom, because he regarded him as more than an equivalent for all those under his power; but

that, notwithstanding his subtilty, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not fully recognize him as the Son of God, and consequently was himself deceived. But having consented to receive him as a ransom for mankind, he was righteously deprived of his dominion over man, while he could not retain Jesus when he discovered him to be the Holy One of God, being horrified and tormented by his holiness.

Athanasius first of all successfully controverted this notion, and maintained that the ransom was paid to God. He argued that as God had threatened to punish transgressors with death, he could but execute his threat. But then it was not becoming the character of God to allow his purpose in the creation of man to be frustrated by an imposition practiced upon him by the devil. The only expedient, therefore, which remained for his deliverance from death was the incarnation and sacrifice of the Logos in his stead, by which the justice and veracity of God would be maintained, man delivered, the law fulfilled, and the power of the devil broken. It has often been stated that Tertullian uses the term satisfaction with respect to Christ's A. for sin, but this is incorrect, for although he employs the term, he never does so in the sense of a vicarious satisfaction, but only in the sense of making amends for our own sins by confession and repentance.

These elemental and mythical conceptions of the doctrine of the A. remained in a most imperfect and altogether undeveloped condition, until the acute and subtle genius of the Piedmontese Abp. of Canterbury reduced them to order, and presented them in logical consistency. Anselm, therefore, must be regarded as the author, at least as to its form, of the doctrine of vicarious satisfaction, which, under various modifications, has ever since continued as the 'orthodox' doctrine of the church. The following is, in all essential respects, his statement of the doctrine: The infinite guilt which man had contracted by the dishonor of his sin against the infinitely great God, could be atoned for by no mere creature; only the God-man, Christ Jesus, could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur, the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life, therefore, was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honor of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren, the race of man.—In this form of the doctrine we are taught the necessity of an active vicarious satisfaction; but Anselm nowhere teaches the passive satisfaction, he nowhere says that Christ endured the punishment of men. Nor do we find in his writ-

ings the development of the subjective side of the doctrine —namely, how the satisfaction rendered to God mediates the A. in the experience of the believer.

After the time of Anselm, and before the Reformation, two views of the A. divided the opinions of the church; one regarding the peculiar manner in which it was accomplished as absolutely necessary, and deriving its efficiency from its objective nature; the other supposing a subjective connection between the sufferings of Jesus and the price of redemption, because this was best fitted to effect the moral transformation of men. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which he atoned; and it needed to be greater, for the payment of the debt due to God gave men no claim to the favor of God. Thomas Aquinas and his followers maintained Augustine's opinion of the infinite value of the blood of Christ rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient. But in the period between Anselm and the Reformation, little or no progress was made in the development of this doctrine.

We come now to the period of the Reformation, when the objective speculations of the schoolmen are brought under the subjective requirements of human souls, and the doctrine of the A. is viewed in this light. In the writings of Luther, one will only with difficulty arrive at his intellectual apprehension of this doctrine in its scientific form; but setting out with the consciousness of sin, one will everywhere discover his firm conviction that in Christ all sin is 'vanquished, killed, and buried, and righteousness remaineth a conqueror and reigneth for ever.' The following is an outline of the Lutheran doctrine, as laid down in the *Concordienformel:* It is only by faith that we can receive the blessing presented to us in the gospel by the Holy Ghost. Faith justifies, because it appropriates the merit of Christ. Therefore, the righteousness which is imputed to the believer, simply by the grace of God, is the obedience, the suffering, the death, and the resurrection of Christ, by which he has satisfied the claims of the law, and atoned for our sins. For as Christ is not merely man, but God and man in one person, he was, as Lord of the law, no more subject to it than he was subject to suffering and death. For this reason, his two-fold obedience—that which he rendered, on the one hand, by his suffering and death, and, on the other, by his righteous fulfillment of the law on our behalf—is imputed to us, and God acquits us of our sins, and regards us as just, in view of his complete obedience in what he did and suffered. This obedience embraces the entire existence of Christ upon earth, and is so complete that it fully covers the disobedience of men, so that their disobedience is not reckoned against them for condemnation. Therefore, Christ is our righteousness only so far as in his entire person the most perfect obedience is exhibited, which he was able to render in that he was neither God alone nor man alone, but both in one, God and man.

According to Calvin: if one asks how Christ has reconciled us with God, and purchased a righteousness which made him favorable to us, it may be answered generally, that Christ accomplished this by the whole course of his obedience. But although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to his death. Calvin attached great importance to the particular mode of his death—any other mode of death would not have rendered the same satisfaction to God. He, however, says little or nothing about Christ's fulfilling the law for us, but dwells upon his delivering us from its curse. He does not, therefore, exhibit his active obedience separated, as an essential part of his satisfaction for sin, from his passive obedience. The importance attached to the obedience of his life arises from its natural and necessary connection with his suffering and death. And the great importance attached to his death is drawn rather from the veiws of its subjective necessity, than from the idea of the divine righteousness—namely, that without such a death there would have been no sufficient ground for the subjective realization of deliverance from sin and guilt. Calvin's view differs from that of the Lutheran *Concordienformel* in that he does not regard the relationship of God to man merely from the standpoint of punitive and satisfying righteousness, which always leads to the merely negative notion of a Redeemer from guilt and punishment, but looks upon Christ as the highest Mediator, through whom the nature of God is communicated to man. There was a necessity for Christ's incarnation, not merely because, apart from the suffering of the God-man, the divine righteousness could not be atoned, but also because, without such a divine Mediator, there could be no vital relation between God and man. 'Had man remained free from all taint, he was of too humble a condition to penetrate to God without a Mediator.'

While the reformers established the doctrine of the A. on the theory of Anselm, and extended it so as to make the sufferings of Christ include the divine curse, and introduced distinctions between Christ's active and passive obedience, Socinus endeavored to prove the falseness of Anselm's theory. He shared with the Protestants the subjective principle, which the period of the Reformation established, but developed it in a one-sided manner. Socinianism represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for him to forgive sin without a satisfaction, as imposing finite limitations upon the divine Being; and also objects to the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and, moreover, objects that sin and punishment are of so personal a nature as not to allow of their being transferred. It further opposes the doctrine of the active and passive obedience of Christ, on the ground that

the one excluded the other. Another objection maintained the actual impossibility of Christ's rendering the supposed satisfaction for sin.

The doctrine which it sought to establish in the place of the one it attempted to overthrow may in brief be stated as follows: Man is reconciled to God by repentance and reformation. Only from an act of man changing his disposition, and not from an act of God changing his relation to man, follows his reconciliation with God. God is in himself ever the same towards man—reconciled from all eternity; man alone has to assume a new relation; as soon as he does this, he is immediately reconciled; by this act of his will, he is at one with God. Only in man's moral state is there any obstacle to his reconciliation. This greatest and holiest accomplishment, the reconciliation of man with God, is achieved by an act of his will.

In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience; for repentance and reformation are regarded as but the two sides of the same act of the will. It follows from this that justification is of works as well as reconciliation. A necessity for the sufferings of Christ is shown for the following objects—that he might become our example; better fitted to render us help; that we might have a pledge and guarantee of the divine forgiveness; and as conditioning his resurrection and ascension to glory.

We must now hasten to the form of this doctrine among 'Modern Calvinists,' without attempting further to exhibit the links in the chain of its historic connection. 'Modern Calvinism' represents the A. as that satisfaction for sin which was rendered to God, in his public character as moral governor of the world, by the perfect obedience unto death of our Lord Jesus Christ. The nature of this satisfaction was a moral, not a pecuniary satisfaction. It preserves to the moral government of God its authority, while its tendency is to procure the forgiveness of sin. The value of the sufferings of Christ consists in their tendency to uphold the divine moral government unimpaired while pardon is extended to those who have violated it, rather than in the intrinsic excellence of those sufferings, which, though essential to, did not constitute their value. There was a moral necessity for Christ's sufferings and death—obstacles to the bestowment of pardon had to be removed—the influence of the Holy Spirit had to be secured. The whole contents of Christ's earthly existence, embracing both his active and passive obedience—a distinction unsupported by the word of God—must be regarded as contributing to the A. which he made. Of the actual sufferings of Christ immediately attending his death, it is not allowable to speak with confidence, so little has been revealed. It may, however, be considered—whether the Saviour's deprivation of his Father's countenance may not have been indirectly caused rather by his awful and afflicting sense of the evil of sin, than other-

wise. As to the 'extent' of the A., there is a broad distinction to be made between the *sufficiency* of the A., and its *efficiency*. It may be true that Jehovah did not intend to exercise upon all men that influence of the Holy Spirit which is necessary to secure the salvation of any one, but as the A. was to become the basis of moral government, it was necessary, that it should be one of infinite worth, and so in itself adequate to the salvation of all. The body called Universalists (q. v.) hold both the efficiency and ultimate sufficiency of this great event in history.

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ATONIC, a. *ă-tŏn′ĭk* [Gr. *a*, not; *tonos*, tone]: wanting tone; debilitated. ATONY, n. *ăt′ŏ-nĭ*, loss of vital energy.

ATOP, ad. *ă-tŏp′* [AS. *a*, on, and *top*]: at or on the top.

ATRABILIARY, a. *ăt′ră-bĭl′ĭ-ėr-ĭ*, or ATRABILIAR, a. *ăt′ră-bĭl′ĭ-ėr*, or ATRABILA′RIAN, a. *-ā′rĭ-ăn*, [F. *atrabilaire* —from mid. L. *atrabilārĭus*, abounding in black bile—from L. *ater*, black; *bilis*, bile]: causing black bile; melancholic; hypochondrias. ATRABILIOUS, a. *ăt′ră-bĭl′ĭ-ŭs*, having abundance of black bile, as the supposed cause of melancholia; melancholic; hypochondriac.

ATRACTENCHYMA, n. *ăt′răk-tĕng′kĭm-ă* [Gr. *atraktos*, a spindle, a distaff; *chumos*, juice, sap]: in *bot.*, tissue composed of spindle-shaped cells.

ATRAMENTACEOUS, a. *ăt-ra-mĕn-tā′shŭs*, or ATRAMEN′TAL, or ATRAMEN′TOUS, *-tŭs* [L. *atramentum*, anything black; ink—from *ater*, dull-black; Eng. *aceous*]: pertaining or relating to ink; inky; black as ink. ATRAMENTA′RIOUS, a. *-tā′rĭ-ŭs*, suitable for the manufacture of ink. Applied especially to copperas, one of its ingredients.

ATRATO, *â-trâ′tō:* river of Colombia, important not by its size, but by its position in connection with the scheme of communication by water between the Atlantic and the Pacific. Rising on the Western Cordillera at an altitude of 10,560 feet, above sea-level, it runs 305 miles northwest through low, swampy country and falls by several mouths, interrupted by bars, into the Gulf of Darien. It is navigable by steamers for fully 250 miles, being 750 to 1,000 feet wide, and 8 to 70 feet deep. A route, surveyed by the United States government in 1871, proposed to connect the Atrato and the Jurador, flowing into the Pacific, by a canal 48 miles long. At the Paris International Congress (1879), that route was, with various others,

discussed and rejected in favor of De Lesseps' line from Limon to Panama. Gold-dust is found in and about the Atrato.

ATROCIOUS, a. *ă-trō'shŭs* [F. *atroce*—from L. *atrōcem*, horrid, terrible]: very wicked; extremely cruel; criminal in the highest degree. ATRO'CIOUSLY, ad. *-lĭ*. ATRO'CIOUSNESS, n. the quality of being atrocious. ATROCITY, n. *ă-trŏs-ĭ-tĭ* [F. *atrocité*, great cruelty—from L. *atrocĭtātem*]: enormous wickedness; cruelty in the highest degree.—SYN. of 'atrocious': heinous; flagitious; flagrant; enormous; grievous.

ATTACH, v. *ăt-tăch'* [F. *attacher*, to tie, to bind, to fasten: *at* for *ad*, or F. *a*, to; Breton *tach*, a nail; *tacha*, to fasten with a nail: Ir. *taca*, a peg: It. *attaccare*, to attach] to fasten or hang; to take by legal authority; to arrest; to fix; to win or gain over. ATTACH'ING, imp. ATTACHED, pp. *ăt-tăcht'*. ATTACH'ABLE, a. *-ă-bl*. ATTACH'MENT, n. seizing of goods by legal authority; warm affection; fidelity; strong regard for. ATTACHÉ, n. *ăt-tă-shā* [F.]: one (usually a young diplomatist) attached to an ambassador as one of his suite or attendants.—SYN. of 'attach': to fix; affix; connect; combine; unite; tie; tack; fasten; subjoin; annex; charm; enamour; win;—of 'attachment': affection; inclination; adherence; fidelity; attendance; regard; adjunct.

ATTACHMENT, in Law: a writ applying both to persons and to property. A. of Person is a process issued by a court of record, directing the sheriff to produce before it the person within named, guilty of contempt of court, either by neglect or abuse of its process or of subordinate powers, or disregard of its injunction, and it is in some degree in the nature of a criminal process.

A. *of Property* is generally in the instance of debt, being issued to the creditor as against the property of the debtor. Its issuance is from a court of law, courts of equity having no power in the premises; in some states, however, it is authorized in chancery. In New England a writ of A. is always incident to a summons in actions upon contract, but in the other states it is issued only upon affidavit showing cause, verifying the plaintiff's base of action, and exhibiting grounds of A. in accordance with the local statute authorizing the writ. In general, the remedy by A. is allowed only to a creditor; in some states, however, there are special statutory provisions by which damages arising *ex delicto* may be sued for by A. Corporations may be proceeded against by A.; but heirs, executors, administrators, trustees and others acting only as representatives, are not liable, as such, in this manner.

The levy of an A. does not change the estate of the defendant in the property attached; nor does the attaching plaintiff acquire any property thereby; nor can he acquire through his A. rights to the property attached, not inhering in the defendant at the time of A.: unless he be able to show the existence of fraud or collusion impairing his rights. The levy constitutes a lien on the property or credits attached, but this lien is of no value unless the plaint-

iff obtain judgment against the defendant, and proceed to subject the property to execution. Where two or more attachments are levied simultaneously against the same property, they are entitled severally to an aliquot part of the proceeds of the property. Where several attachments are levied successively on the same property, a junior attaching creditor may impeach a senior A., or judgment thereon, for fraud. During the pendency of a suit, an officer may deliver over attached property in his hands to some responsible person, styled a receipter or bailee, who must receipt for it while awaiting the action of the court. In some states possession may be retained by the defendant by executing a bond with sureties for the delivery thereof, either to satisfy the execution, or when and where the court may direct. An A. may be dissolved by a final judgment for the defendant, or, on motion, on account of defects in the plaintiff's proceedings, apparent on their face.

Garnishment is an effectual A. of the defendant's effects in the garnishee's hands, but no judgment can be rendered against the garnishee until judgment against the defendant shall have been recovered. A debt not due may be attached in the hands of the garnishee, but he cannot be required to pay the same until it becomes due. See FOREIGN ATTACHMENT.

ATTACK, v. *ăt-tăk'* [F. *attaquer;* Sp. *atacar,* to attack (see ATTACH)]: to fall upon with force or violence; to assault; to assail in words; to begin to dissolve as a chemical agent: N. a falling upon with violence; satire; unfriendly criticism. ATTACK'ING, imp. ATTACKED, pp. *ăt-tăkt'*.—SYN. of 'attack, v.': to assail; assault; encounter; invade;—of 'attack, n.': onset; charge.

ATTACK', in Warfare: an advance upon the enemy, with a view of driving him from his position, whether in the open field or within fortifications.

In an attack in the openfield, the general first ascertains the strength and position of the enemy, by means of a reconnaissance or of spies. He then seeks to discover at what point the enemy can make the least resistance, generally on one or other flank. He next arranges to concentrate his chief strength upon this particular point; and to mask his real intention by feigned operations in other places. He then attacks with energy and force; his troops advancing without halt till near enough to use their weapons with the greatest effect. The more the attack has the character of a 'surprise,' the greater the probability of its success. Various forms have been devised for the attack; but the usual form is the *parallel* or *frontal.* Another mode combines an attack on one flank as well as in front, by two separate corps; so as either to get into the enemy's rear, or to perplex him as to his retreat. See TACTICS.

In an A. upon a fortress, the operation is a part of that of besieging (see SIEGE); but very often intrenchments are attacked in the open field. Such an A. has the character

of a surprise, when the works are approached under cover of night, and an attempt is made to break into them on all sides. In such case there is a reserve corps, which is rapidly brought up when wanted; but the attacking corps retire behind the reserve if repulsed. The artillery post themselves on the prolongation of the line of works, and try to dislodge the enemy's guns and gunners; or pour a concentric fire sufficient to breach the works. The infantry advance as close as will enable them to fire upon the gunners. When the enemy's fire is silenced, the engineers (under cover of the artillery) proceed to remove palisades and all other obstacles, and to bridge over ditches and openings. Then follow the operations of the storming-party. See ASSAULT.

ATTACUS, n. *ăt'tăk-ŭs* [L. *attacus*—from Gr. *attakos* and *attakes*, a kind of locust]: genus of moths belonging to the family *Bombycidæ*. *A. Cynthia* is the Ailanthus Silkworm, so called because its caterpillar feeds upon the Ailanthus-tree, *Ailanthus glandulosus*.

ATTAGAS, n. *ăt'ta-găs*, or ATTAGEN, n. *ăt'ta-jĕn* [Gr. *attagas*, a long-billed bird, fond of the water, and esteemed a great delicacy. The Godwit (?). Also L. *attagen*, a hazel-hen, or heath-cock, found in Spain, the south of France, etc.]: the *attagas* of Buffon, the *attagen* of Aldrovandi, is believed by Cuvier to be the young or the female of *Tetras bonasia*, and the *attagen* or *gallinga* to be the pintailed grouse. The latter of these is found all round the coasts of the Mediterranean.

ATTAIN, v. *ăt-tān'* [F. *atteindre*, to touch, to attain—from L. *attingĕrĕ*, to touch against—from L. *ad*, *tango*, I touch]: to come to or reach by exertion; to arrive at; to gain; to achieve. ATTAIN'ING, imp. ATTAINED, pp. *ăt-tānd'*. ATTAINABLE, a. *ăt-tān'ă-bl*, that may be attained by efforts of the body or mind. ATTAIN'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, or ATTAIN'ABLENESS, n. *-bl-nĕs*, the quality of being attainable. ATTAIN'MENT, n. the act of arriving at or reaching by effort; proficiency in any branch of knowledge.—SYN. of 'attain': to acquire; obtain; gain; win; earn; procure.

ATTAIN'DER: the legal consequence of judgment of death or outlawry, in respect of treason or felony; formerly involving *forfeiture of estate*, real and personal, and *corruption of blood*, and generally, in present usage, involving extinction of civil rights and capacities. Thus, an attainted person cannot sue in a court of justice; he loses all power over his property; and he is by his A. rendered incapable of performing any of the duties or entering into any of the privileges of a free citizen. But absolute and severe as formerly were the consequences of A., neither the government nor the crown could exercise absolute or capricious authority regarding an attainted person; everything was to be according to principle and rule, and for the ends of public justice. Formerly an attainted person

could not give evidence in a court of justice; but that disability has been removed.

Since the revision of the law, 1870, the forfeiture of estate and corruption of blood by A. are no longer legal in Britain. For A. by express legislative enactment in parliament, see BILL. In the United States A. has never had legal existence, being utterly forbidden by the federal constitution (art. i. sec. 9), 'No bill of attainder or ex-post facto law shall be passed.'

ATTAINT, v. *ăt-tānt'* [OF. *attaindre*, to accuse, to stain; *attaint*, accused, stained—from L. *attingĕrĕ*, to touch against—from L. *ad*, to; *tingo*, I stain, or *tango*, I touch]: to reach or attain to; to corrupt; to taint; to disgrace; to find guilty of treason or felony; to render infamous: N. a stain; reproach; hurt. ATTAINT'ING, imp. ATTAINT'ED, pp. ATTAINTURE, n. *ăt-tān'tūr*, state of being attainted. ATTAINDER, n. *ăt-tān'dĕr*, that which renders impure; in Britain, an act of parliament decreeing the loss of civil rights and estate for the crime of treason or other capital offense, is called an *Act of Attainder;* the judicial process is called a *Bill of Attainder:* (*Note.*—There can be but little doubt that *tango*, I touch, and not *tingo*, I stain, is the primary root-word. A person's reputation is *reached* or *touched* by the sentence of a court of justice, and so his character is disgraced and stained, and becomes attainted; etymologically, to *attaint* is 'to convict,' and *attainder* is 'the conviction'—see Skeat and Wedgwood.)

ATTAINT', WRIT OF: anciently in England a mode of inquiring whether a jury had given a false verdict; now abolished.

ATTAKAPAS, *ăt-tŭk'a-pâ:* a large and fertile district in the s.w. of Louisiana, which includes the parishes of Iberia, Lafayette, St. Martha, St. Mary, and Vermillion. It is chiefly remarkable for its large production of sugar and molasses.

ATTALEA, *ăt-tă-lē'a:* genus of palms, comprising a number of species, natives of the tropical parts of S. America. They have in general lofty, cylindrical, smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry, fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching, and those of some are woven into hats, mats, etc. The nuts of *A. excelsa* and of *A. speciosa* are burned to dry the India-rubber obtained from the *Siphonia elastica*, which acquires its black color from their smoke. The leaf-stalks of *A. funifera*, found in the s. maritime provinces of Brazil, and there called Piassaba, yield a fibre much used for cordage. The ropes made of it are very strong, and extremely durable in salt water. The Piassaba palm of the n. parts of Brazil, however, is totally different, and much of the Piassaba (q. v.) fibre exported to other countries is obtained from it. The fruit of *A. funifera*, known by the name of Coquilla nut (q. v.) is as large as an ostrich's egg, and supplies a kind

of vegetable ivory, used for making umbrella handles, etc. The fruit of *A. compta*, the Pindóva or Indajà palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown.

ATTAR, n. *ăt'târ*, or OTTO OF ROSES, *ŏt'tō* [Hind. *atr*, essence: Arab. *itr*, perfume]: a precious oil made in eastern countries, usually from roses; a valuable perfume. See OTTO.

ATTELABUS, n. *ăt-tĕl'a-bŭs* [L. *attelabus*—from Gr. *attelabos*, a small, wingless species of locust]: genus of Coleoptera (Beetles), belonging to the family *Curculionidæ*, or *Weevils;* originally introduced by Linnæus with the character, 'Head attenuated, behind inclined. Antennæ somewhat thick toward the apex.' In the 13th edition of his *Systema Naturæ* (1767), thirteen species are enumerated; but most of these are now transferred to the genus Coleoptera.

ATTEMPER, v. *ăt-tĕm'pėr* [OF. *atemprer*, to modify—from L. *ad*, to; *tempĕro*, I mix in due proportion]: to mix in proper proportions; to soften or moderate; to modify; to mingle. ATTEM'PERING, imp. ATTEM'PERED, pp. *-pėrd.* ATTEM'PERLY, ad. *-lĭ*, in *Œ.*, in a temperate manner. ATTEM'PERMENT, n. the act of tempering, or the state of being tempered.

ATTEMPT, v. *ăt-tĕmt'* [F. *attenter*, to attempt: OF. *atempter*, to undertake; *tempter*, to try—from L. *ad*, to; *tento*, I try]: to try; to make an effort to accomplish; to endeavor: N. an attack; an endeavor to gain a point. ATTEMPT'ING, imp. ATTEMPT'ED, pp. ATTEMPT'ER, n. one who. ATTEMPT'ABLE, a. *-ă-bl*, that may be attempted or tried. ATTEMPTABILITY, n. *ăt-tĕmp-ta-bĭl'ĭ-tĭ*, capability of being attempted; a person or persons, or a thing or things capable of being attempted. ATTEMPTATE, n. *ăt-tĕm'tāt*, an attempt or endeavor, especially to commit a crime. In 1589, Puttenham ranked this word as one recently introduced; but it arose somewhat earlier than he thought.—SYN. of 'attempt, n.': trial; exertion; endeavor; effort; attack; essay.

ATTEMPT, to commit a felony or criminal offense: in many instances equally cognizable by the criminal tribunals with the completed crime itself. See TREASON: FELONY; MISDEMEANOR.

ATTEND, v. *ăt-tĕnd* [F. *attendre:* OF. *atendre*, to wait: It. *attendere*, to expect, to await—from L. *attendĕrĕ*, to attend—from L. *ad*, to; *tendo*, I stretch out]: to wait on; to accompany; to be present; to listen to; to fix one's attention upon. ATTEND'ING, imp. ATTEND'ED, pp. ATTEND'ANT, n. a follower; a servant: ADJ. accompanying; being present. ATTENDANCE, n. *ăt-tĕn'dăns*, act of serving or waiting on; duty; in *Œ.*, attention; regard. ATTENTION, n. *ăt-tĕn'shŭn* [F.—L.]: the act of attending; paying heed to; steady application of the mind; act of courtesy. ATTENTIVE, a. *ăt-tĕn'tĭv*, paying due regard to; mindful. ATTENT', a. [L. *attentus*, attentive]: contr. for *attentive.*

ATTEN'TIVELY, ad. *-tĭv-lĭ*. ATTEN'TIVENESS, n. the quality of being attentive. To DANCE ATTENDANCE, to wait on and obey the caprices of another.—SYN. of 'attend': to mind; regard; notice; heed; wait on; hearken; listen; accompany; escort;—of 'attention': application; study; care; heed; consideration; regard; respect; advertence;—of 'attentive': careful; mindful; observant; watchful; circumspect; intent. Attention is the word that has been introduced into technical psychology rather recently to designate the selective function of consciousness; the fact that not all sensory stimuli are permitted to enter consciousness, but that some few are chosen on the basis of internal conditions, rather than external, to become clear components of mind.

Two main problems arise in connection with attention: (1) the question as to the change that is wrought in the character of the mental state attended to and (2) the question as to the conditions or cause of attending. The first question is ordinarily answered by the statement that the sensation attended to becomes clear and distinct, is more fully conscious, while all else is less clear. Whether this change is identical with that induced by increased intensity of the external stimulus is still an open question. Certain it is that in many essentials the change due to attention resembles that due to increase in the intensity of the external impression. Both result in more complete consciousness, greater likelihood of recall and increased quickness of response. The difficulties in identifying the two are of a theoretical character and need not concern us here.

The question why we attend has been differently answered by different theories. Popularly it is asserted that we attend either because we are interested, or because we make a great effort. Each of these terms requires further analysis and when analysed largely vanishes into a complex of factors. Interest seems on analysis to be either a feeling process that results from attention or the name for a number of mental qualities. Certainly interest cannot be something inherent in the object, for it changes from person to person and in the same individual from moment to moment. If we trace the conditions of interest we find them very largely in the instincts of the race, in the education and early experience of the individual and in the particular mood or purpose that is dominant at the moment. These we may regard as the real conditions of attention as well as of interest.

Effort, too, when analysed, reduces to a series of mental accompaniments of attending, or to other mental tendencies or characteristics. As a mental state, psychologists are today almost unanimous in reducing effort to a mass of sensations from muscles in different parts of the body, forehead, jaws, etc., that are contracted reflexly during the conflict of motives. As a condition, effort reduces, in all probability, to other early influences, mainly social, and these are characteristic because frequently opposed to the conditions of interest

In general, then, it may be said that attention is a state of mind in which certain ideas are clear at the expense of others, and that this condition is due to the heredity, education, in the broadest sense, and temporary mood of the individual.

ATTENTATES, n. pl. *ăt-tĕn′tāts* [Fr. *attentat*, an attempt—from L. *attentata*, nom. plu. of pp. of *attento*, to stretch out, to attempt]: proceedings in a court of judicature, pending suit, and after an inhibition is decreed; things done after an extra-judicial manner.

ATTENUATE, v. *ăt-tĕn′ū-āt* [*L. attenuātus*, made very thin—from *ad*, to; *tenŭō*, I make thin—from *tenŭis*, thin: F. *attenuer*]: to make very thin; to reduce in thickness or density. ATTEN′UATING, imp. ATTEN′UATED, pp. ATTENUATION, n. *ăt-tĕn′ū-ā′shŭn* [F.—L.]: the act of making thin, fine, or slender. ATTENUANT, a. *ăt-tĕn′ū-ănt*, making thin: N. a medicine which attenuates.

ATTERATE, v. *ăt′tėr-āt* [L. *attero*, to rub at, towards, or against—from *ad*, to; *tero*, to rub]: to rub away; to form or accumulate by rubbing away. AT′TERATED, pp. AT′TERATING, imp. ATTERA′TION, n. *-ā′shŭn*, the process of wasting the land away by the action of the waves.

ATTERBURY, *ăt′er-bėr-ĭ*, FRANCIS, Bp. of Rochester: 1662, March 6—1732, Feb. 15; b. Milton, near Newport Pagnel, Buckinghamshire; educated at Westminister School and Christ Church, Oxford. In 1693, he went to London, where his rhetorical powers soon won reputation. He became a royal chaplain, minister of Bridewell, and lecturer of St. Bride's. He was combative, turbulent, and ambitious; a caustic and reckless controversialist; and, as a zealous partisan of the ecclesiastical against the civil authority, he received promotion, becoming, 1704, Dean of Carlisle; 1707, Canon of Exeter. In 1710, he was chosen prolocutor to the lower house of convocation; in 1712, became Dean of Christ Church; in 1713, was made Bp. of Rochester and Dean of Westminster. The death of Queen Anne extinguished his hopes for the primacy. His deep complicity in a succession of plots for the restoration of the Stuarts brought upon him at length the charge of treason, and, 1722, Aug., he was committed to the Tower. By a bill of pains and penalties, passed in the lords by 83 to 43, A., who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the king's dominions, and condemned to perpetual banishment. But even here, in 1725, he was actively engaged in fomenting discontent in the Highlands of Scotland. As a composer of sermons he still retains a great portion of his original reputation. His letters, also, are extremely easy and elegant; but, as a critic and a controversialist, he is deemed rather dexterous and popular than profound.

ATTEST, v. *ăt-tĕst′* [F. *attester*, to attest—from L. *attestāri*, to bear witness to—from L. *ad*. to; *testor*, I bear witness—from *testis*, a witness]: to bear witness to; to cer-

tify; to affirm solemnly in words or writing. ATTEST'ING, imp. ATTEST'ED, pp. ATTES'TOR or ATTES'TER, n. one who. ATTESTATION, n. *ăt'tĕs-tā'shŭn* [F.—L.]: the act of bearing witness to; putting a name to a writing to show it to be authentic (see DEEDS: WILLS: WITNESSES: TESTING CLAUSE); in *mil.*, the act of signing a declaration and taking a verbal oath on the part of a recruit, that he will serve the sovereign faithfully for a specified time. ATTES'TATIVE, a. or ATTES'TIVE, a. *-tĭv*, attesting; containing an attestation.

ATTEYNANT, a. *ăt-tān'ănt* [L. *attinens*—from *attineo*]: attainable; appertaining.

ATTIC, a. *ăt'tĭk* [L. *Attĭcus:* Gr. *Attĭkos*, pertaining to Attica or Athens: It. *attico:* F. *attique*]: pertaining to Attica, a state in Greece; elegant; classical; applied byAthenian architects to an order or series of small square pillars placed upon the uppermost part of a building: N. an Athenian; a low story rising above the cornice that terminates the main elevation of a building; the flat or floor on the upper part of a house; a garret; in *arch.*, a plain or decorated parapet-wall on the upper part of the façade of a building. ATTICISM, n. *ăt'tĭ-sĭzm*, the purest style of the Greek language—Attic dialect being the dialect of Athens, in which most of the great works of Greek antiquity were written. ATTICIZE, v. *ăt'tĭ-sīz*, to make use of atticism. AT'TICIZ'ING, imp. ATTICIZED, pp. *ăt'tĭ-sīzd'*. ATTIC MUSE, n. *ăt'tĭk mūz*, a fine poetic vein.

ATTICA, *ăt'tĭ-ka:* one of the political divisions or states of Ancient Greece or Hellas, of which Athens was the capital. The territory is triangular, having its n.e. and s.w. sides washed by the sea, while on the n. it is connected with the mainland. In ancient times, it was bounded on the w. by Megaris and the Gulf of Saronica; on the s., which ran out into the 'marble steep' of Sunium, by the Ægean Sea; on the e. by the Ægean Sea; and on the n. by Bœotia, from which it is separated by a lofty range of hills, the most famous part of which was formerly called Cithæron. Ancient A. was thus walled in from the rest of Greece. The two principal rivers were the Cephissus and Ilissus; and if they exhibited the same features in ancient times as now, must have been mere mountain-torrents, dry in summer. The unfruitfulness of the soil, and the scarcity of water, compelled the inhabitants occasionally to send out colonies. According to ancient tradition, the aborigines of A. were civilized first under Cecrops, who is said to have come hither from Sais, at the mouth of the Nile in Egypt, about B.C. 1550; and to have introduced the culture of olives, and of several species of grain, as also to have implanted milder manners, and taught the worship of the gods. He is stated to have divided the country into twelve communities or states. This, however, was not the only division known in early A. A still older division into *phylai*, or tribes, existed, also a minute subdivision into *demoi*, or townships. By Theseus, Athens was united

with the eleven other states of A. under one government, of which Athens was made the seat. After this union of the several states, the whole of A. shared in the fortunes of Athens (q. v.), and, under Vespasian, became a Roman province. On the division of the Roman empire, A. naturally fell into the hands of the Greek emperors. In A.D. 396, it was captured by Alaric, King of the Goths. It is impossible to determine precisely what its population was in ancient times. Clinton estimates it at upwards of half a million, but this is probably too large.

In the present arrangement, Attica and Bœotia form a dept. or govt. in the kingdom of Greece. The surface of the country is broken into hills and narrow plains. The most considerable hills are—Parnes, 4,634 ft.; Cithæron, 4,624; Pentelicus, famous for its marble in ancient times, of a white brilliant appearance and perdurable character, 3,641; and Hymettus, 3,368. The largest plains extend in the neighborhoods of Athens and Eleusis. As early as the time of Solon, A. was well cultivated, and produced wine and corn. Mount Hymettus was celebrated for its bees and honey, and metals were found in the range of Laurium. Figs, olives, and grapes are still cultivated. Goats and sheep find suitable pasturage; but the country does not now produce much grain.

ATTICUS, *ăt'ĭ-kŭs*, TITUS POMPONIUS: one of the most noble and generous men in ancient Rome: B.C. 109—B.C. 32: born a few years before the birth of Cicero. His excellent education with Torquatus, the younger Marius, and Cicero, was supplemented by a stay in Athens, where he remained many years, glad to be separated from the political distractions of his native land. After B.C. 65, when he was induced by Sulla to return to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take part in political affairs, though exerting much influence on public matters. A. had inherited great wealth, which he had increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself to death. Among his personal friends, Cicero held the first place. The *Annales*, written by A., containing genealogical histories of the old Roman families, were highly commended by his contemporaries. In A. fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw that would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings have been preserved. His biography is found in Cornelius Nepos, and in Cicero's *Epistles to A.*

ATTIGUOUSNESS, n. *ăt-tĭg'ū-ŭs-nĕs* [Eng. *attiguous*—from L. *attiguus*—from *attigo*, old form of *attingo*, to touch]: the quality of being attiguous; contiguity.

ATTILA, *ăt'ĭl-a* [Ger. *Etzel;* Hungarian, *Ethele*, conjectured to have been originally titles of honor]: King of the

Huns (d. 453); son of Mundzuk, a Hun of the royal blood. In 434, he succeeded his uncle Roas as chief of countless hordes scattered over the n. of Asia and Europe. His brother Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by A. 444 or 445. The Huns regarded A. with superstitious reverence, and Christendom with superstitious dread, as the 'Scourge of God.' It was believed that he was armed with a supernatural sword, which belonged to the Scythian god of war, which must win dominion over the whole world. It is not known when the name 'Scourge of God' was first applied to A. He is said to have received it from a hermit in Gaul. The whole race of Huns was regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Vandals, Ostrogoths, Gepidæ, and many of the Franks, fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e., from the frontiers of Gaul to those of China. In 447, after his unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The emperor Theodosius collected an army to oppose the inundation of the barbarians, but was defeated in three bloody engagements. Constantinople owed its safety solely to its fortification and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; seventy flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451, A. turned his course to the West, to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and Theodoric, King of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Plain—waited to meet the enemy. The army of the West, under Aëtius and Theodoric, encountered the forces of the Huns near the site now occupied by the city of Chalons-sur-Marne. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle, and after a terrible contest the ranks of the Romans and their allies, the Visigoths, were broken. A. now regarded victory as certain, when the Gothic prince, Thorismund, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and A. with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries

of A. that not less than 252,000 or 300,000 slain were left on the field. A. having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. In the following year, A. had recovered his strength, and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, Apennines, and the lagoons of the Adriatic Sea, where they founded Venice. The Roman emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I., who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans, and old chronicles relate that the apostles Peter and Paul visited the camp of A., and changed his purpose. By 453, however, A. appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko. His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their king. It is said, that his body was placed in three coffins —the first, of gold; the second, of silver; and the third, of iron; that the caparison of his horses, with his arms and ornaments, was buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the King of the Huns. The description that Jornandes has left us of this barbarian king reminds us of his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body. See Thierry, *Histoire d'Attila* (1814).

ATTIRE, v. *ăt-tīr'* [OF. *atour*, female head-dress; *atirer*, to adorn—from O. Ger., and O. Sax. *tir*, glory]: to adorn with garments; to dress; to array: N. clothes; apparel. ATTIR'ING, imp. ATTIRED, pp. *ăt-tīrd'*.

ATTITUDE, n. *ăt'tĭ-tūd* [F. *attitude*, posture—from It. *attitu'dinĕ*, disposition to act: Sp. *actitúd*, attitude, position]: position of persons or things; posture; a position assumed or studied to serve a purpose. ATTITUDINAL, a. *ăt'-tĭ-tū'dĭ-năl*, pertaining to. ATTITUDINIZE, v. *ăt'tĭ-tū'dĭ-nīz*, to assume affected airs or postures. AT'TITU'DINI'ZING, imp. AT'TITU'DINIZED, pp. *-nīzd*. ATTITUDINARIAN, n. *ăt-tĭ-tū-dĭn-ā'rĭ-ăn*, one who gives particular attention to attitudes.—SYN. of 'attitude': posture; action; gesture; gesticulation; appearance. Attitude as used in art signifies a pose or position assumed by living figures, and requires a regular study, including a knowledge of anatomy.

ATTLE, *ăt'tl* [perhaps corrupted from *addle*, rotten, which see]: a term used in Cornwall for rubbish thrown out of a mine, containing little or no ore.

ATTLEBORO, *ăt'tl-bŭr-rō:* town in Bristol co., Mass., on the main line and on branches of the New York, New Haven and Hartford railroad; about 30 m. s. w. of Boston and 12 m. n. e. of Providence. The town is composed of several villages and contains banks, a fine system of public schools, several churches, a public library of several thousand volumes, an almshouse, and the Attleboro Home Sanitarium. The chief trade of the town is in jewelry, it sharing with Providence the bulk of that business east of Newark and New York. There are about 50 establishments turning out clocks, rings, bracelets, lockets, chains, charms, etc. Other manufactures are jewelers' supplies, silverware, buttons, yarn, cotton and knit goods, cotton goods machinery, leather, shuttles, boots and shoes, coffin trimmings, and carriages. There are also gold and silver refineries and smelters, bleacheries and dye-houses. A. was settled 1669, and its garrison was one of those holding the line of fortifications against the Indians. from Boston to Newport. The town formerly included Cumberland, R. I.,—it was called 'North Purchase,' and was incorporated as a separate village 1694, Oct. 19, taking its name from Attleborough, England. The water-works are owned and operated by the community, and the government is administered by annual town meetings. Pop. (1910) 16,215.

ATTOCK, *ăt-tŏk':* town and fort of the Punjab, on the left or e. bank of the Indus. The town stands below the fort, a parallelogram of 800 yds. by 400, established by the emperor Akbar, 1581, to defend the passage of the river, but it is no longer a position of strength. The great railway bridge across the Indus here was opened 1883. It has 5 arches 130 ft. high, and renders continuous the railway connection between Calcutta and Peshawur (1,600 m.). Pop. 4,210. The situation of A. is important, whether in a commercial or in a military view. It is at the head of the steamboat navigation of the Indus, being 940 m. from its mouth; while about 2 m. above it, the Cabul river, the only considerable affluent of the Indus from the w. is practicable for vessels of 40 or 50 tons to a distance of 50 m.

ATTORN, v. *ăt-tŭrn'* [O.F. *attorner*, to direct, to dispose—from *torner*, *tourner*, to turn: Ital. *attorniare*, to encompass, to enclose; *attorner*, about: L.L. *attornare*, *attorniare*, *atturnare*, to commit business to another, to attorn—from clas. L. *ad*, to; *torno*, to turn in a lathe, to round off—from Gr. *tornus*, a carpenter's tool like our compasses]: to transfer the feudal allegiance of a vassal, or the vassals generally, to a new lord on his obtaining an estate from its former possessor; to profess to become tenant of a new lord. ATTORNING, imp.

ATTORNEY, n. *at-tèr'nĭ*, ATTOR'NEYS, n. plu. [Norm. F. *attourné:* mid. L. *attornātus*, put in the place of any one —from L. *tornārĕ*, to turn, to fashion: OF. *atorné*, directed, arranged for business]: one put in the turn or place of another; one who acts for another, as in a court of law; a lawyer. ATTOR'NEYSHIP, n. the office of an attorney. ATTOR'NEY-GENERAL, in Eng., the head law officer of the crown: in the United States, an official in each state, and in the cabinet at Washington, having charge of the legal business of the governments which they respectively serve; they appear, or serve, in all suits in which their government is a party, and advise in all its legal proceedings and interests. POWER OR LETTER OF ATTORNEY, written authority given to one person empowering him to act for, or to transact certain business for another.

ATTORNEYS OR COUNSELLORS-AT-LAW, AND SOLICITORS: legal practitioners who conduct litigation in courts of justice; (in England) preparing the cause for the barristers, whose duty and privilege it is to plead and argue in open court on behalf of the contending parties; in the United States usually both preparing the case in private, and presenting it in court. A. and S. also practice conveyancing, or the preparation of legal deeds and instruments, and they manage much other general business connected with the practice of the law, for which, as well as for the discharge of all their duties, they are mostly remunerated by a fixed and minute scale of charges.

They are called A., as practitioners in the courts of common law, because the attorney is one who is put in the place, stead, or *turn* of another. In former times when prosecuting or defending, suitors were obliged to appear *personally* in court; but now A. may represent, and can often prosecute or defend any action or suit in the absence of, the parties. They are called *Solicitors* in the courts of chancery and equity; and the same name is sometimes given to this profession when transacting family or other general business out of court, and in their own chambers. Solicitor is the term sometimes applied also to the law-officer of a city, etc. A., being admitted by the courts, of which therefore they are officers, have many privileges as such; and they are in consequence peculiarly subject to the control and censure of the judges.

In the United States, A. and S. are officers in a court of justice employed by parties in suits to manage the same before the court. These may either be selected by the parties to the action, or, in case of default in this, may be designated by the court. The eligibility of legal practitioners to hold such positions is decided by local legislation or by the rules of the court. Thus women can act as attorneys-at-law only in the several states when permitted by special statute, but any woman of good standing at the bar of the supreme court of any state or territory or of the Dist. of Columbia for three years, and of good moral character, may become a member of the bar of the supreme court of the U. S.

In the absence of fraud, the client is concluded by the

acts, and even by the omissions, of his attorney; the duties of the attorney being—to be true to the court and to his client; to manage the business of his client with care, skill, and integrity; to keep his client informed as to the state of his business; to keep his secrets confided to him as such; and he is privileged from disclosing such secrets when called as a witness.

ATTORNEY-GENERAL: in English law, an important officer under the king, made by letters patent. His most important duties are to exhibit informations and prosecute for the crown in matters criminal, and to file bills in the exchequer in any matter concerning the king's revenue. The attorney-general of the United States is an officer appointed by the President. He is required by statute to give his advice and opinion upon questions of law whenever required by the president; to pass upon the validity of the title to public lands purchased for the erection of public buildings by the United States; when requested, to give his opinion to the head of any executive department on any questions of law arising in his department; to conduct and argue all cases in which the United States is interested, whenever he deems it best for the interests of the United States for him to do so; to exercise general superintendence and direction over the attorneys and marshals of all the districts in the United States and the Territories as to the manner of discharging their respective duties. The attorney-general is also a member of the Cabinet, and according to the provisions of the act of Congress of 1886, Jan. 19, is the fourth in succession, after the Vice-President, to the office of President in case of a vacancy in that office. In each of the United States there is an attorney-general, or similar officer, who appears for the people, as in England he appears for the Crown. Only a few of the duties of the attorney-generals in the various States are defined by statute, consequently, so far as applicable to our altered situation, jurisprudence, and system of government, attorney-generals of the various states are clothed with the common law powers of the attorney-generals of England. The attorney-general of England had the power (1) to prosecute all actions necessary for the protection and defense of the property and revenues of the Crown; (2) by information to bring certain classes of persons accused of crimes and misdemeanors to trial; (3) by '*scire facias*' to revoke and annul grants made by the Crown improperly, or when forfeited by the grantee thereof; (4) by information, to recover money or other chattels or damages for wrongs committed on the land, or other possessions of the Crown; (5) by writ of *quo warranto*, to determine the right of him who claims or usurps any office, franchise, or liberty, and to vacate the charter, or annul the existence of a corporation for violations of its charter, or for omitting to exercise its corporate powers; (6) by writ of mandamus to compel the admission of an officer duly chosen to his office, and to compel his restoration when illegally ousted; (7) by information to chancery, to enforce trusts, and to pre-

vent public nuisances, and the abuse of trust powers; (8) by proceedings *in rem*, to recover property to which the Crown may be entitled, by forfeiture for treason, and property for which there is no other legal owner, such as wrecks, treasure trove, etc.; (9) and in certain cases, by information in chancery, for the protection of the rights of lunatics, and others who are under the protection of the Crown.

ATTOUR, prep. and ad. *ăt-tôr'* [Fr. *autour*, round about; or Eng. *out, over*, pronounced rapidly and indistinctly]: as prep., over; across; beyond; above; further onward than; exceeding in number: past; as adv., moreover.

ATTRACT, v. *ăt-trăkt'* [OF. *attraicter*, to attract—from mid. L. *attractārĕ*, to draw forth—from L. *ad.* to; *tractus*, drawn]: to draw to by some kind of influence; to allure. ATTRACT'ING, imp. ATTRACTED, pp. *ăt-trăk'tĕd*. ATTRAC'TOR, n. one who. ATTRACTABLE, a. *ăt-trăk'tă-bl*, that may be attracted. ATTRACT'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, power of attraction. ATTRACTILE, a. *ăt-trăk'tĭl*, that can attract. ATTRACTION, n. *ăt-trăk'shŭn*, the act of drawing to; that which draws; the power that bodies have of coming together and uniting—*attractions* take place between bodies—*affinities* between the particles of a body. ATTRACTIVE, a. *ăt-trăk'tĭv*, drawing to; alluring. ATTRAC'TIVELY, ad. *-tĭv-lĭ*. ATTRAC'TIVENESS, n. the quality of being attractive or engaging. ATTRACT'INGLY, ad. *-lĭ*. ATTRACTION OF GRAVITATION, that power which acts at all distances throughout the universe. CAPILLARY ATTRACTION, that power which causes liquids to rise in small tubes or porous substances. CHEMICAL ATTRACTION OR AFFINITY, the power by which the ultimate particles of bodies of unlike kinds unite to form a new body possessing new properties. COHESIVE ATTRACTION OR ATTRACTION OF COHESION, that power which causes the particles of a body to unite or cohere to form a recognized body, whether aëriform; fluid, or solid. For the various forms of attraction see COHESION; ELECTRICITY, PRINCIPLES OF; ETHER; GRAVITATION; MAGNETISM; MOLECULAR THEORY; SURFACE TENSION.—SYN. of 'attract': to allure; invite; entice; draw; charm; engage.

ATTRACTION: general name for the force or forces by which all bodies, from the minutest particles to the largest planets, suns, and systems of suns, tend to approach, or are *drawn toward* one another, and when in contact, are held together. The term is generic, embracing a vast variety of facts, which are subdivided under five heads or species of A. These are—1. Gravitation; 2. Cohesion; 3. Adhesion, including Capillary A.; 4. Chemical Affinity; 5. The attractions of Electricity, Magnetism, etc. See GRAVITATION: COHESION, etc., as above. Attempts have been made to deduce all these phenomena from one principle of A., modified by an opposing force of repulsion, but as yet without success. Still less can they be explained by assuming only *one* force—A. alone, or repulsion alone—for this, too, has been

attempted. The idea of an attractive force acting as the bond of the universe was first introduced as a scientific hypothesis by Newton, and was violently combated by Leibnitz and others.

ATTRAHENT, a. *ăt'trā-hĕnt* [L. *attrahen'tem*, drawing to—from *ad*, to; *traho*, I draw]: drawing or attracting.

ATTRECTATION, n. *ăt-trĕk-tā'shŭn* [L. *attrectatio*—from *attrecto*, to touch, to handle—from *ad*, to; *tracto*, to drag about—freq. from *traho*, to draw]: the act of handling frequently; the state of being frequently handled.

ATTRIBUTE, v. *ăt-trĭb'ūt* [F. *attribut*, an attribute—from L. *attrĭbūtus*, given or assigned to—from L. *ad*, to; *tribūtus*, granted; bestowed]: to make over to; to give as due; to ascribe to. ATTRIB'UTING, imp. ATTRIBUTED, pp. *ăt-trĭb'ū-tĕd*. ATTRIBUTE, n. *ăt'trĭ-būt*, a quality considered as belonging to, or inherent in, any person or thing. ATTRIBUTIVE, a. *ăt-trĭb'ū-tĭv*, pertaining to an attribute: N. in *gram.*, applied to words, as adjectives, which denote an attribute. ATTRIBUTABLE, a. *ăt-trĭb'ū-tă-bl*, that may be ascribed to. AT'TRIBU'TION, n. *-bū'shŭn* [F.—L.]: the act of attributing to; commendation.—SYN. of 'attribute, v.': to ascribe; impute; assign;—of 'attribute, n.': property; quality; symbol.

AT'TRIBUTE, in the Fine Arts: a species of symbol, consisting of a secondary figure or object accompanying the principal figure—as the trident of Neptune, or the owl of Minerva Attributes serve to mark the character meant, and add to the significance of the representation. The necessity of using them lies in the limited means of expression possessed by the formative arts. Attributes may be either essential or conventional. Essential attributes have some real relation or resemblance to the object or idea to be expressed; and are often such as could stand alone as symbols—as the bee, representing diligence. Attributes in the strictest sense, and as distinguished from symbols, are such as are significant only in connection with a figure, to which they in a manner belong; e. g., the wings of genii, the finger on the mouth of Harpocrates. The last is an example of an accidental or conventional A., of which kind are also the *anchor*, to express hope; the *cross*, faith. Common attributes in Christian art are—the harp for King David, and writing materials for the evangelists, especially the apostle John.

AT'TRIBUTE, in Logic: the opposite of *Substance*. The latter is considered as self-existent, while the former can be conceived as possessing only a dependent existence. Attributes are commonly said to belong to substances. Thus, wisdom, holiness, goodness, and truth are termed attributes of God, who is himself regarded as the substance in which they inhere; in like manner, whiteness is called an A. of snow.

ATTRITION, n. *ăt-trĭsh'ŭn* [F. *attrition*—from L. *attrītiōnem*—from *attrītus*, rubbed or worn away—from L. *ad*, to; *trītus*, rubbed]: the act of wearing by rubbing; state

of being worn by friction; the least measure of sorrow, or lowest degree of repentance, the result of fear—as opposed to *contrition*, the highest degree of real repentance. ATTRITE, a. *ăt-trīt'*, in *OE.*, worn by rubbing; penitent. ATTRITENESS, n. *ăt-trīt'nĕs*, the quality of being rubbed away or worn down by friction.

ATTUNE, v. *ăt-tūn'* [L. *ad*, to, and *tune*]: to put in tune; to make musical; to arrange fitly. ATTUN'ING, imp. ATTUNED, pp. *ăt-tūnd'*.

ATUA, n. *ā'tū-ă*, or AKUA, n. *ā'kū-ă* [Polynesian *Atu*, Master or Lord—primarily, core or kernel]: the chief word for God throughout eastern Polynesia—meaning primarily, 'He who is the very core and life of man.'

ATUN, n. *a-tŭn':* a fish, the *Thyrsites atun*, belonging to the family of *Trichiuridæ*, or *Hair-tailed* fishes. It feeds voraciously on the calamary, is found near s. Africa and Australia, and is prized for its delicate flesh.

ATWAIN, ad. *ă-twān'* [AS. *a*, in, and *twain*]: in *OE.*, in twain: asunder.

AT'WATER, *ăt'waw-ter*, LYMAN HOTCHKISS, American theologian: b. Hampden, Ct., 1813, Feb. 23; d. Princeton, N. J., 1883, Feb. 17. He was pastor of the First Congregational Church in Fairfield, Ct., in 1835–54; in the last named year becoming professor of mental and moral philosophy at Princeton College, and, in 1869, professor of logic, metaphysics, political science, economics and ethics there. He was the author of a *Manual of Elementary Logic* (1867).

AT'WATER, WILBER OLIN, American chemist: b. Johnsburg, N. Y., 1844, May 3. He was graduated at Wesleyan University in 1865; made a special study of chemistry in the Sheffield Scientific School of Yale and the universities of Leipsic and Berlin. He has been successively professor of chemistry in East Tennessee University, Maine State College, and Wesleyan University. He was director of the Connecticut Agricultural Experiment Station, 1875-7, and was appointed director of the Storrs (Conn.) Experiment Station in 1887. He has been connected for several years with the United States Department of Agriculture; has published a large number of papers on chemical and allied subjects; and since 1894, has given much attention to nutrition investigations.

AT'WILL, *ăt'wĭll*, EDWARD ROBERT, American bishop: b. Red Hook, N. Y., 1840, Jan. 18. He was graduated from Columbus University in 1862, and General Theological Seminary, 1864. He was rector of St. Paul's Church, Burlington, Vt., 1867–80; of Trinity Parish, Toledo, O., 1881–90; and was consecrated first Protestant Episcopal bishop of West Missouri, 1890, Oct. 14.

AT'WOOD, *ăt'wûd*, CHARLES B., American architect: b. Millbury, Mass. 1849, May 18; d. Chicago, 1895, Dec. 19. He studied at the Harvard Scientific School, and opened an office in 1872. Within three years he received prizes for

designs for the San Francisco city hall, the Connecticut State capitol, the court house in Springfield, Mass., and a commission to build the Holyoke, Mass., city hall. Removing to New York in 1875, he designed residences for W. H. Vanderbilt, Elliot F. Shepard, and W. D. Sloane, and interior decorations for the houses of Mrs. Mark Hopkins in San Francisco and Gt. Barrington, Mass. In 1884 he gained the first prize for a design for the Boston Public Library, and later a prize of $5,000 for plans for a new city hall in New York city. From 1891–3 he was associated with D. H. Burnham in planning the World's Fair buildings in Chicago. The art buildings, peristyle, service building, and many minor features were from his designs. He was a close student of his art, and a marvelous draughtsman, using his left hand with sureness and rapidity.

AT'WOOD, George, an eminent English mathematician: b. London 1746; d. 1807, July 11. In 1874 he published *Treatise on the Rectilinear Motion and Rotation of Bodies; with a Description of Original Experiments relative to that Subject*—a work remarkable for its perspicuity and the extensive information which it affords. About the same time he made public an *Analysis of a Course of Lectures on the Principles of Natural Philosophy*, read at the University of Cambridge, which is not less valuable than the preceding. He published a *Dissertation on the Construction and Properties of Arches* (1801), and several other valuable treatises relating to mathematics and mechanical science. He invented a machine still used in physical lecture-rooms, which affords great facilities for verifying the laws of falling bodies. See Atwood's Machine.

AT'WOOD, Isaac Morgan, American educator: b. Pembroke, N. Y., 1838, March 24. He was ordained in the Universalist Church in 1861; held several pastorates; edited *The Christian Leader* (1867–73); became an associate editor of the *Universalist Leader;* and was chosen president of the Canton (N. Y.) Theological Seminary in 1879. His chief works are: *Have We Outgrown Christianity?* (1870); *Latest Word of Universalism* (1878); *Manual of Revelation* (1888); *Walks About Zion* (1881); *Episcopacy* (1885); *Revelation* (1893); *Balance Sheet of Biblical Criticism* (1896); *A System of Christian Doctrines*, etc.

AT'WOOD, Melville, Anglo-American geologist: b. 1812, July 31. Prescott Hall, England; d. Berkeley, Cal., 1898, April 25. He studied lithology, microscopy, and geology early in life, and engaged in gold and diamond mining in Brazil. In 1843 he made a discovery that greatly enhanced the value of zinc ore. After coming to the United States, in 1852, he invented the blanket system of amalgamation. He also established the value of the famous Comstock silver lode, by an assay of minerals in that region.

AT'WOOD'S MACHINE: an instrument devised by George Atwood, an English physicist, for illustrating the principles governing the motion of falling bodies, and

described by him in a book published in 1784. It consists essentially of a light wheel or pulley, over which a thin, flexible cord passes. A mass of matter is attached to each end of the cord, and the experiment consists in observing the velocity acquired by the system at the end of a given time. The mass to be moved is evidently the sum of the two masses attached to the ends of the cord (assuming that the wheel is light enough to be disregarded); and the force tending to set the system in motion is the difference of the weights of the two masses. By making these masses nearly equal, the motion can be made slow enough to be conveniently studied. The intensity of gravity can be determined by the aid of this machine, with sufficient accuracy for class-room purposes, and it is an admirable device for illustrating the laws of uniformly accelerated motion.

ATYA, n. *a-tī′a* [from *Atys:* Gr. *Atus*, the name of several persons mentioned in classic history or mythology. The most notable was an effeminate and foppish youth, killed by Tydeus in the Theban war]: name given by Leach to a genus of decapod long-tailed crustaceans. They have the forceps terminating the four claws cleft as far as its base, or appearing to be composed of two fingers in the form of lashes united at their origin.

ATYPIC, a. *a-tĭp′ĭk* [Gr. *a*, without: L. *typus*—from Gr. *tupos*, a model, a type]: in *nat. sci.*, not having typical characters.

ATYPUS, n. *a-tī′pŭs* [Gr. *a*, without; *tupos*, a type]: genus of spiders belonging to the family *Mygalidæ*. The A. *Solzeri* excavates in the ground, to the depth of seven or eight inches a cylindrical tube, which it lines with silk. It is found in France.

AUBAGNE, *ō-bâñ* (anc. *Albania*): town of the dept. of Bouches-du-Rhone, France; on the Huveaune, 9 m. e. from Marseilles, with which it is connected by railway. The ancient town stood on a hill, at the base of which the present town is situated. It was the cap. of the Albicii, subdued by Julius Cæsar. The castle, once of great strength, is now in ruins. The church was founded 1164. The town has manufactories of pottery, tiles, paper, etc., and tanneries and distilleries. Pop. 5,200.

AUBAINE, n. *ō-bān′* [F. *aubaine*, escheat, right of succession in a sovereign to an alien's goods—from *aubain*, a foreigner]: in France, the right in succession of the sovereign to the goods of a foreigner not naturalized, at his death—abolished 1819; anciently the barbarous right of the sovereign to wrecked vessels and goods.

AUBANEL, *ō-bă-nĕl′*, Theodore: French poet, sometimes called 'The Petrarch of France:' b. 1829; d. 1886. He devoted his life to the restoration of the troubadour literature. His drama, *Lou Pan don Pecat*, was successfully staged in 1878 at Montpellier.

AUBE, *ōb:* river in France; tributary of the Seine, rising near Pralay, on the plateau of Langres; flowing n. w. by Rouvres, La Ferté, Bar, and Arcis; and falling into the Seine at Pont-sur-Seine, after a course of 90 m.

AUBE: a dept. of France, occupying the s. part of the old prov. of Champagne, and a small portion of Burgundy: bounded on the n. by the Marne; e. by the Haute-Marne; s.w. by the Yonne; n.w. by the Seine-et-Marne. The e. part belongs to the basin of the A; the w. to the basin of the Seine. Area, 2,310 sq. m. The climate is mild, moist, and changeable; but on the whole healthful. A great portion of the area is arable land. The n.e. is applied chiefly to pasturage; but the s.e. is far more fertile, rich in meadow-land and forest, and producing grain, hemp, rape, hay, timber, and wine. In minerals the department has little besides limestone, marl, and potters' clay. The chief manufactures are woolen cloth, cotton and linen goods, ribbons and stockings, leather, parchment, etc. The sausages and bacon of A. have long been famous. *Troyes* is the cap. Pop. (1901) 246,163.

AUBENAS, *ōb-nâ':* town in France, dept. of Ardèche; picturesquely situated on the right bank of the Ardèche, 14 m. s.w. from Privas, in the middle of the volcanic region of Vivarais. From a distance its appearance is good, but the streets, with the exception of one traversed by the diligence, are narrow and crooked, the squares small, and the houses very irregularly built. An old and rapidly decaying wall, flanked with towers, girds the town, which contains an ancient castle. A. is the principal mart for the sale of chestnuts and silk in the department. Several important fairs are also held here. It has manufactures of silk, paper, cotton, coarse cloths, leather, etc., the machinery of the mills being driven by water. Pop. 8,000.

AUBER, *ō-baìr'*, Daniel François Esprit: 1784, Jan. 29—1871, May 14; b. Caen, Normandy: composer of operas. His father was a print-seller in Paris, and sent his son to London to learn the trade. But his irresistible passion was for music, and he soon returned to Paris. Among his earliest compositions may be noticed—the *concertos* for the violoncello, ascribed to Lamare the violoncellist; the concerto for the violin, played by Mazas with great applause at the Conservatory of Music, Paris; and the comic opera, *Julie*, with a modest accompaniment for two violins, two altos, and a bass. These works were very successful; but A., aspiring to greater things, now engaged in a deeper study of music under Cherubini, and wrote a mass for four voices. His next work, the opera *Le Séjour Militaire* (1813), was so coldly received that A. grew disheartened, and resolved to abandon the idea of reaching eminence as a musical composer. However, the death of his father compelled him to be dependent on his own resources; and in 1819 appeared *Le Testament et les Billets-doux*, also unsuccessful, but in *La Bergère Châtelaine* he laid the foundation of his subsequent fame. In

all these early essays, as well as in the opera of *Emma* (1821), his style was original; but afterwards he became an imitator of Rossini, and disfigured his melodies with false decorations and strivings for effect. All his latter works excepting *La Muette de Portici* (Masaniello), 1828, are written with an assumed mannerism, but in a light and flowing style, with many piquant melodies which have made the tour of Europe and America. The operas *Leicester* (1822), *La Neige* (1823), *Le Concert à la Cour*, and *Léocadie* (1824), *Le Maçon* (1825), *Fiorella* (1826), *La Fiancée* (1829), *Fra Diavolo* (1830), were followed by a series of lighter works: *L'Elixir d'Amour*, *Le Dieu et la Bajadère*, *Les Faux Monnayeurs*, etc.; the later operas, *Gustave ou le Bal Masqué*, *Le Lac des Fées*, *Le Cheval de Bronze*, *Les Diamants de la Couronne*, *La Part du Diable* *La Sirène*, and *Haydée*, exhibiting the same popular qualities as their predecessors; but their interest is evanescent, as they are deficient in depth of thought and feeling. His later works are *Jenny Bell* (1855), and *Manon Lescaut* (1856). In 1842, A. was appointed director of the Conservatory of Music, Paris.

AUBERGE, n. *o-bairzh* [Fr.]: an inn; a place of entertainment for travellers.

AUBERGINES, n. pl. *o-bair-zhēn* [Fr.]: a name for the fruit of two species of solanum.

AUBERVILLIERS, *ō-bĕr-vē-yā':* village in France; a suburb of Paris. It is notable for a church known as Notre Dame des Virtus, containing a picture of the Virgin which was believed to possess miraculous powers. A little to the east of A. is a fort constructed in 1842. Pop. nearly 20,000.

AUBIGNÉ, Merle d': see Merle d'Aubigné.

AUBIGNÉ, *ō-bēn-yā'*, Theodore Agrippa d': 1550, Feb. 8—1630, Apr. 29; b. near Pons in Saintonge: famous French scholar. He had remarkable talent for the acquisition of languages. Although of noble family, he inherited no wealth, and chose the military profession. In 1567, he distinguished himself by his services to the Protestant cause, and was rewarded by Henry IV., who made him vice-admiral of Guienne and Bretagne. His severe and inflexible character frequently embroiled him with the court; and in 1620 he betook himself to Geneva, where he died. His best-known work is his *Histoire Universelle*, 1550-1601 (Amst. 1616-20), which was burned in France by the common hangman, as also his *Histoire Secrète, écrite par lui-même* (1721). His spirit of biting satire appears in his *Confession Catholique du Sieur de Sancy* and *Adventures du Baron de Foeneste*. His complete works are published in 5 vols. (Par. 1873); and Lives of him by Réaume (Par. 1883), Morillot (Par. 1884), and Von Salis (Heidelb. 1884).

AUBRY DE MONTDIDIER, *ō-brē' dĕh mōn-de-de-ā':* a French knight in the time of Charles V.; assassinated, as tradition says, in the forest of Bondy by Richard de Macaire, 1371. The latter became suspected of the crime

on account of the dog belonging to the deceased Aubry invariably showing toward him an unappeasable enmity. Macaire was therefore required by the king to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterwards, under the titles of *Aubry's Dog*, *The Wood of Bondy*, *The Dog of Montargis*, frequently acted, the 'dog' always gaining the greatest share of applause.

AUBURN, *aw'bern*: city and county-seat of Androscoggin co., Maine; on the w. bank of the Androscoggin river (by which it is separated from Lewiston City); and on the Maine Central and Grand Trunk railroads; 34 m. n. of Portland. The most important industry is the manufacture of boots and shoes, the yearly product being about $7,000,000; other industries are machine shops, cotton mill, shoe findings, last, box and carriage factories, beef and packing houses, dairy products, marble and foundry products, lumber, shuttles and spools. The city contains numerous churches, several banks, the Edward Little High School, a Catholic Parochial School, numerous public schools, parks, the county buildings and several hotels. There is an excellent electric street railway system and the city owns and operates the water-works. A. comprises a part of a large tract of land granted by the general court of Massachusetts in 1765 and was originally known as Bakerstown; was settled about 1786, incorporated as a town in 1842, and as a city in 1869. The municipal government consists of a mayor, board of aldermen and board of common councilmen, all elected annually. The administrative offices are appointive by the council or by the mayor subject to the approval of the council. Pop. (1910) 15,064.

AUBURN: city and county-seat of Cayuga co. N. Y.; on Owasco river, the outlet of Owasco lake; on the N. Y. Central and the Lehigh Valley railroads; 25 m. s. w. of Syracuse. Owasco river furnishes good water-power for the industries which include agricultural implements, tool, carpet, cordage and shoe factories, woollen mills, breweries, etc. A. contains many fine public and private buildings including a general hospital costing $100,000, a municipal hospital for contagious diseases, the court house, the Case Memorial Library, the Burtis Auditorium, and the United States government building. The most remarkable institution here is the Auburn state prison, whose vast and massive structures cover 18 acres of ground, enclosed by a wall 3,000 ft. long and from 12 to 35 ft. high. There are accommodations for about 1,200 convicts. The educational institutions include the Auburn Theological Seminary (Presbyterian) founded in 1820, a public high school, numerous public grammar schools and several Roman Catholic parish schools. There are also churches,

banks and public halls, daily, weekly and monthly periodicals and an excellent water-works system, owned and operated by the municipality. The city was first settled by John Hardenburgh about 1793, and was called Hardenburgh's Corners until 1805 when the name was changed to Auburn and it was made the county-seat; it was incorporated as a village 1815 and as a city 1848. The city government under a charter of 1879 consists of a mayor, elected for two years, and a board of aldermen of 10 members, the mayor appointing the principal department officials. Pop. (1910) 34,668.

AUBUSSON, *ō-bū-sōn'*, PIERRE D', grand master of the order of St. John of Jerusalem: 1423-1503; b. of an ancient and noble French family. His early history is imperfectly known, but he is said to have borne arms, when very young, against the Turks in the wars in Hungary, and to have distinguished himself by zeal and valor. Here he acquired that intense antipathy to the 'Infidels' which subsequently animated his whole public career, and gave a peculiar bias to his ambition. Having returned to France, he accompanied the dauphin in his expedition against the Swiss. His mind, however, constantly reverted to the ominous encroachments in the East of the dreaded Mussulman, and at last he enrolled himself at Rhodes among the brotherhood of Christian knights, from which time his history emerges into clear light. He swept the Levant, and chastised the pirates who prowled perpetually among the Greek isles. In 1458, he succeeded in forming a kind of Christian league between the French monarch and Ladislaus, King of Hungary, against Mohammed II. He was continually impressed with the necessity of a vast organization of all Christendom to overthrow the power of the Turks. Step by step he won his way to supreme power in his order. In 1476 he was elected grand master. It was a critical period for the civilization and religion of Europe. Constantinople had recently been taken and the Byzantine empire destroyed by Mohammed II. Every day the conqueror marched further west. Thrace, Macedonia, Central Greece, Servia, Wallachia, Bosnia, Negropont, Lesbos, and the islands of the Adriatic had been successively conquered by him. Proud of his rapid success, and sustained by an immense prestige, the sultan threatened to dictate terms from Rome to the entire West. Rhodes, however, stood in his way, the sentinel isle of Christianity, on the great maritime route between Asia and Europe. Mohammed saw that here the battle between the two faiths must be joined; and in 1480, May, a Turkish army of 100,000 men, commanded by a Green renegade, Palæologos, landed in the island and began the siege of the town. Two desperate assaults were made. The Turks were repulsed, and sailed away, leaving 9,000 dead. Mohammed was enraged, and planned a second expedition, which was interrupted by his death at Nicomedeia, in Asia Minor, 1481, May. After this A. was prominent in the religious diplomacy of the papal court. Meanwhile his exertions to

improve the internal organization of the brotherhood excited admiration throughout Christendom. At the age of 78 he was appointed generalissimo of the forces of the German emperor, the French king, and the pope against the Turks; and enthusiastically entered on his duties, and sailed to attack Mitylene; but the expedition failed on account of the discordant aims of the various belligerents. Broken by disappointment and vexation, the grand master returned, and died at Rhodes.

AUCH, *ōsh:* cap. of the dept. of Gers, in the s. of France; on the river Gers, 42 m. w. of Toulouse; lat. 43° 33′ n., long. 0° 35′ e. It is the seat of an abp., and has a museum of natural science, with an old and beautiful cathedral, the painted windows of which are greatly admired. Its chief articles of trade are woolen and cotton stuffs, fruits, wine, and brandy.

In ancient times it was called *Elimberis;* and at a somewhat later period took its name from the Auscii, whose chief town it was. In the 8th c., it became the cap. of Gascony; and later, of the county of Armagnac. Pop. 15,000.

AUCHAN, n. *aw'kan,* or ACHAN, n. *â'chan* [deriv. uncertain]: a kind of pear.

AUCHENIA, *aw-kē'nĭ-a* [from the Gr. *auchen,* the neck]: genus of ruminating quadrupeds, of which the Llama (q.v.) and the Alpaca (q.v.) are best known. The genus is exclusively S. American; indeed, the species occur only on the lofty ranges of the Andes. They are nearly allied to the camels, and may be regarded as their representatives in the zoology of America. They form, with them, the family *Camelidæ* (see CAMEL), and were included by Linnæus in the genus *Camelus.* They agree with the camels in certain important anatomical characters, particularly in the structure of the stomach; and resemble them very much in general form.

AUCHMUTY, RICHARD TYLDEN: an American philanthropist; b. in New York city 1831. He practiced architecture for many years; served through the Civil War in the Union Army; afterward retired from business. With his wife he founded the New York Trade Schools at a cost of $250,000, on a plan which was entirely original, and which was made permanent in 1892 by an endowment of $500,000 by J. Pierpont Morgan. D. 1893, July 18.

AUCHTERARDER, *ŏk'tĕr-ar'dĕr:* village in the s.e. of Perthshire, on the w. of the Scottish Central railway. The chief employment is cotton-weaving. The popular opposition to the presentee to the church of A. originated (1839) the struggle which ended in the secession from the Church of Scotland and the formation of the Free Church, 1843. Pop. over 3,000.

AUCK'LAND: the northern provincial dist. of New Zealand, including fully a half of North Island, abt. 400 m. long by 200 wide at its greatest breadth. A. has a coast line of nearly 1,200 m.; and is remarkable for its rivers, which serve as carriage-ways for the produce of the in-

terior. There are three almost natural divisions of this district: North Peninsula, East Coast, and the Waikato Country—the latter two mainly in the hands of the natives. Gold, copper, tin, iron, coal, and other minerals are in A. A. is very rich in timber, the most important tree being the Kauri pine. The fossil gum found wherever the Kauri forests have been is an important article of export. Much New Zealand flax is grown. The climate of A. is pleasant and healthful. Volcanic action has deeply left its mark on the surface of A.; there is still an active volcano near the city of Auckland; and the warm lake and geyser scenery of the region is very remarkable. A. is now called strictly, not province, but 'provincial district.' Pop. (1875) 79,104; (1881) 99,451; (1891) 133,267; (1901) 175,938.

AUCK'LAND: second city of New Zealand, on the Hauraki Gulf: till 1865, cap. of New Zealand, when the seat of govt. was transferred to Wellington. A. is distant from Sydney 1,236 m.; from Melbourne, 1,650. Picturesquely situated, its position for commerce is also excellent, as in addition to its harbor at Waitemata it has also a western harbor, the Manakan, 6 m. distant. A. is surrounded by numerous thriving villages, with several of which it is connected by railway. It contains a well laid-out botanical garden, and numerous public buildings, government house, barracks, etc. Chief manufacturing interests are ship-building yards, boiler works, glass works, shoe factories, etc. A. was founded 1840. The temperature appears to be singularly equable. The mean of the coldest month is 51° F., and that of the warmest 68°. The annual rainfall is 45½ inches; and the days of rainfall average 100. Pop. (1901) 34,213; but including suburban districts, 67,226.

AUCK'LAND, Earl of, GEORGE EDEN, Gov. Gen. of India: 1784–1849, Jan. 1; son of William Eden, Lord Auckland, whom he succeeded, 1814, as Lord A. He joined Earl Grey's administration, 1833, Nov., and in July following, in Viscount Melbourne's first ministry, he became first lord of the admiralty. He vacated that office in Nov., but was appointed again, 1846. In 1835, he went out to India as gov. gen., and returned to England, 1841.

AUCK'LAND, Lord, WILLIAM EDEN: 1744–1814, May 28; third son of Sir Robert Eden, Bart., of West Auckland, Durham. He was educated at Eton and Oxford, and called to the bar 1768. In 1772, he was appointed under-sec. of state, and afterwards filled the positions of a lord of trade, a commissioner to treat with the insurgent colonists of North America, chief sec. to the lord lieut. of Ireland, minister plenipotentiary to France (concluding a commercial treaty with that country, 1786), ambassador to Spain, ambassador to Holland, and joint-postmaster-gen. In 1788, he was created an Irish peer as Baron A., and in 1793 a British baron. A. was the author of the *Principles of the Penal Law* (1771, 8vo); *Remarks on the Apparent Circumstances of the War* (1795); *Speech on*

the Income-tax (1799); *Speech in Support of the Union with Ireland* (1800); and other pamphlets.

AUCK'LAND ISLANDS: group of islands s. of New Zealand, abt. the 51st parallel s., and the 167th meridian e. The largest of them measures 30 m. by 15. It has two good harbors, and is covered with the richest vegetation. The Auckland Islands are valuable chiefly as a whaling station, being at the confluence, as it were, of the Pacific and Southern oceans.

AUCTION [from the Latin *auctio*, increasing or enhancement]: a public sale of property to the highest bidder. This definition, however, does not apply in the case of what is known as 'Dutch Auction' (properly no auction at all), in which the usual process is reversed, and a price is put by the auctioneer upon the goods offered, which price is reduced till it reaches a sum which some purchaser is willing to give. The word A. and the mode of sale are both of Roman origin, and the system is believed to have been first employed in the disposition of spoils of war, when a spear was stuck into the ground to attract customers, and the sale was said to occur *sub hasta* (under the spear). Auctions are conducted under 'specific conditions of sale,' these being the terms, and, in fact, a portion of the contract between buyer and seller. The fall of the auctioneer's hammer is accepted as concluding the sale, unless some other means are specified in the conditions. These conditions usually accompany the catalogue and description of the article or articles offered for sale; and the descriptions, etc., are obliged by law to be honest, and to describe as faithfully as is practicable the character and condition of the object or right to be disposed of Conditions which are binding to seller and purchaser alike, are—1st, no attempt shall be made by the seller by means of fictitious offers to enhance the selling price of his goods; 2d, that no combination or conspiracy among purchasers to prevent competition shall be permitted. In the conduct of auctions the exposer or seller may fix an 'upset price' on his goods, or may reserve any portion of them to himself, unless the same be declared to be 'without reserve,' in which case all bidding or reservation in behalf of the seller is barred. An auctioneer, according to the weight of authority, who sells stolen property is liable to the owner, notwithstanding that the goods were sold by him, and the proceeds paid over to the thief without notice of the felony. An auctioneer is also liable for want of care of the goods while in his possession. The auctioneer has a lien upon the goods for the charges of the sale, and for his commission.

AUCTION, n. *awk'shŭn* [L. *auctĭōnem*, increase]: a public sale of property to the highest bidder. AUC'TIONARY, a. *-ėr-ĭ*, pertaining to. AUCTIONEER, n. *awk'shŭn-ēr'*, one empowered to sell property by auction. V. to dispose of goods by auction. AUC'TIONEER'ING, n.

AUCTIONEER, *awk'shŭn-ēr'*: the person who conducts

an auction (q.v.). The A. is in a certain sense the agent both of seller and purchaser, and by the fall of his hammer, or by writing the purchaser's name in his book, he binds him to accept the article sold at the price indicated. The A. may also, and frequently does, act as agent for absent purchasers, or for persons who have instructed him to make biddings for them during the sale. In both cases, however, the purchaser must be *bona fide*, otherwise the A. would himself become a 'puffer.' Where the A. declines or omits to disclose the seller's name, he undertakes his responsibilities to the purchasers. To the seller, again, he is responsible for ordinary skill, assiduity, and prudence.

AUCUBA, *aw'kū-ba:* genus of plants of the nat. ord. *Cornacæ* (q.v.) of which the best known species is *A. Japonica*, an evergreen shrub resembling a laurel, but with dichotomous or verticillate yellow branches, and, as seen in Europe, always with pale green leaves curiously mottled with yellow. It is dicœcious, produces its small purple flowers in summer, and ripens its fruit, a small red drupe, in March. It is a native of China and Japan, and is now known to be at least as hardy as the common laurel. It is often called the Variegated Laurel, and is a very common ornamental shrub. The mottled appearance of the leaf is said, however, not to belong to the plant in its ordinary natural state; but only this variety has yet been brought to Europe, and of it only the female plant.

AUDACIOUS, a. *aw-dā'shŭs* [F. *audacieux;* It. *audace*, audacious: F. *audace;* L. *audācĭă*, boldness — from L. *audācem*, bold]: very bold and daring; impudent; forward. AUDA'CIOUSLY, ad. *-lĭ*. AUDACITY, n. *aw-dăs'ĭ-tĭ*, boldness; impudence. AUDA'CIOUSNESS, n. the quality of being audacious.—SYN. of 'audacity': effrontery; hardihood; hardiness; boldness.

AUDÆUS, *aw-dē'ŭs*, AUDI'US (or, according to his native Syriac name, *Udo*): d. abt. 370: founder of a religious sect in Mesopotamia. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism. His conduct and his doctrine seemed dangerous to the welfare of the church, and he was excommunicated. His somewhat numerous disciples then clung more closely to him, and he was elected their bishop. In 338, he was banished to Scythia, where he instituted a kind of rival church, and where he died. Modern knowledge of his character and opinions is derived from unfriendly authorities, such as Augustine, Athanasius, etc., therefore to be accepted with caution. But his labors among the fierce barbarians in the north are acknowledged to have been beneficial, and one writer, Epiphanius, states that he ought to be considered *schismatical*, but not *heretical*. But if the leading feature of his system was, as is alleged, a decided tendency to anthropomorphism, it does not appear—according to the principles upon which the church usually proceeded—why he should not have been called a heretic. He is said to have

held that the language of the Old Testament justifies the belief that God has a sensible form—a doctrine deemed heretical in all ages of the church's history. AUDÆ'ANISM, or AUDI'ANISM, the doctrine of A. AUDÆANS, followers of Audæus.

AUDE, *ōd* (*Atax*): river in the s. of France; rises in the e. Pyrenees, not far from Mont Louis; flows for some time parallel to the canal of Languedoc; and falls into the Mediterranean 6 m. e.n.e. of Narbonne, after a course of more than 120 m.

AUDE: maritime dept. in the s. of France. The s. part of A. is mountainous, but the greater portion of it belongs to the valley of the lower A. and the canal of Languedoc. The mountains are composed of granite, while the soil or the plains is chiefly calcareous, and near the coast is extremely fertile, producing cereals, olives, fruits, and wines. A. is rich in iron and coal, and mineral springs. The woolen and silk manufactures are of considerable value. Chief town, Carcassonne. Pop. of A. 311,386.

AUDEBERT, *ōd-bair'*, JEAN BAPTISTE: distinguished French naturalist; 1759–1800; b. Rochefort; studied the arts of design and painting at Paris; and in early life gained eminence as a miniature-painter. Having been much employed by naturalists in painting the more rare and beautiful objects in their collections, he published on his own account (Paris, 1800) a splendid volume, which raised him at once to celebrity, both as painter and author. This work, the *Histoire Naturelle des Singes, des Makis, et des Galéopithèques* (Natural History of Monkeys, Lemurs, and Flying Lemurs), was a large folio, with 62 colored plates, remarkable for truth and beauty. In his *Histoire des Colibris, des Oiseaux-mouches, des Jacamars et des Promérops* (Natural History of Humming-birds, Jacamars, and Promeropses), he gave his plates even greater brilliancy and finish.

AUDETTE, *aw-dĕt'*, LOUIS ARTHUR, Canadian lawyer: b. Quebec, 1856, Dec. 14. He was educated at Quebec Seminary and Laval University; called to the bar in 1880; was secretary to the board of arbitrations appointed in 1893 to determine disputed matters of account between Canada and the provinces of Ontario and Quebec; and also became registrar of the exchequer court of Canada. He published *The Practice of the Exchequer Court of Canada* (1895).

AUDIBLE, a. *aw'dĭ-bl* [mid. L. *audibĭ'lis*, that may be easily heard—from L. *audĭō*, I hear: It. *audibile*, audible]: that may be heard; loud enough to be perceived by the ear. AU'DIBLY, ad. *-blĭ*, in a manner to be heard. AUDIBLENESS, n. *aw'dĭ-bl-nĕs*, the quality of being audible. AU'DIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the being loud enough to be heard. AUDIENCE, n. *aw'dĭ-ĕns* [F.—L. *audĭĕn'tĭă*, hearing]: admittance to a hearing; an interview; an assembly of hearers. AU'DIENCE CHAMBER, n. *chām'bėr*, a chamber in which audiences are granted. AU'DIENCE COURT, n. *cōrt*, a court belonging to the Abp. of Canterbury. Being accustomed

formerly to hear causes extra-judicially in his own palace, he usually requested that difficult points should be discussed by men learned in the law, called *auditors*, whence ultimately sprang up by degrees a court held to have equal authority with that of Arches, though inferior to it both in dignity and antiquity. The audience court is now merged in the Court of Arches, the duties of its former presiding officer being discharged by the Dean of the Arches.

AUDIOMETER, n. *aw-dĭ-ŏm′ĕt-ėr*, or AUDIMETER, n. *aw-dĭm′ĕt-ėr* [L. *audio*, I hear; Gr. *metron*, measure]: an instrument devised by Prof. Hughes, the inventor of the microphone, and described by Dr. Richardson at a meeting of the Royal Soc., 1879. Its object is to measure with precision the sense of hearing. Among its constituent parts are an induction coil, a microphone key, and a telephone.

AUDIPHONE, *aw′dĭ-fōn:* an invention by Mr. Rhodes of Chicago, to assist the hearing of deaf persons in whom the auditory nerve is not entirely destroyed. The instrument, made of a thin sheet of ebonite rubber or hard vulcanite, is about the size of a palm-leaf fan, with a handle and strings attached to bend it into a curving form, and a small clamp for fixing the string at the handles. The A. is pressed by the deaf person using it against his upper front teeth, with the convex side outwards; when so placed it communicates the vibrations caused by musical sounds or articulate speech to the teeth and bones of the skull, thence to the organs of hearing. For different sounds, it requires to be focused to different degrees of convexity. A simple strip of fine glazed mill-board has been recommended by some experimenters as cheaper and equally serviceable; and birch-wood veneer has been used with success for the same purpose.

AUDIT, n. *aw′dĭt*] L. *audit*, he hears; *audītum*, a hearing, a report—from *audĭō*, I hear]: an examination of accounts by a person or persons appointed for the purpose, to ascertain whether they be correct; final account: V. to examine and report as to the correctness of accounts. AU′DITING, imp. AUDITED, pp. *aw′dĭ-tĕd*. AU′DITOR, n. *-dĭ-tėr*, a hearer: an officer appointed to examine accounts, in behalf either of the government, of courts of law, of corporations, or of private persons. AU′DITORSHIP, n. the office of an auditor. AUDITORY, n. *aw′dĭ-tėr-ĭ*, an assembly of hearers: ADJ. able to hear; pertaining to the sense of hearing. AUDITORIUM, n. *aw-dĭ-tō′rĭ-ŭm* [L. *auditorium*, a lecture-room, a hall of justice]: in ancient churches, the nave; that part of a theatre or public building in which the audience sit. AUDIT HOUSE, n. a house appendant to most cathedrals, designed for the transaction of business.

AUDITA QUERELA, used as n. *aw-dĭ′ta kwĕ-rē′la* [L.—*lit.* a heard complaint, or a complaint having been heard]: in *law*, a writ now rarely used, which stayed judgments, and gave the person against whom it had gone forth a rehearing on the ground that he had a good de-

fense, but that by the forms of law he had no opportunity of making it.

AU'DITORY NERVE, in Anat.: the nerve associated with the facial; seventh nerve in order of origin from the brain, counting from the front backwards. The seventh pair consists of the portio dura or facial, the portio mollis or auditory, and a small intermediate portion. The portio mollis apparently commences by some white streaks in the floor of the fourth ventricle; it then runs forward to the back of the petrous portion of the temporal bone, and enters the internal auditory meatus. The facial then leaves it to pass along the canal called the Aqueductus Fallopii, and the auditory divides into two portions, which diverge—the smaller one posterior for the semicircular canals and the vestibule, the other for the cochlea. Those entering the semicircular canals divide into five branches, forming at last a nervous expansion somewhat analogous to the retina. The fibres of the A. N. terminate in cells, called the hair-cells, of the organ of Corti. The latter is a complicated mechanism composed of rods of varying length, like the strings of a harp, which are supposed to receive and differentiate the sound waves which are then conveyed to the brain centre where they are perceived by the consciousness and recognized as tones.

AUDOUIN, *ō'dooăn'*, Jean Victor: French naturalist: b. Paris, 1797; d. 1841. He was professor of entomology in the Paris natural history museum and was the founder and first president of the Entomological Society. He wrote much respecting the injuries done by insects to vine and silk culture.

AUDRAN, *ō-drŏn'*, Gérard: one of the most celebrated engravers of the French school: 1640–1703; b. Lyons; of a family distinguished in this department of art. After three years' residence at Rome, where he studied under Carlo Maratti, and won high repute by his engraving of Pope Clement IX., he was recalled to France by Colbert, and appointed engraver to his majesty Louis XIV. Here he engraved the principal works of Lebrun, with whom he lived in closest friendship. His masterpieces are a series of engravings illustrating the battles of Alexander.

AUDUBON, *aw'du-bŭn*, John James: distinguished American ornithologist; 1780, May—1851, Jan. 27; b. Lou., of French parentage. About the age of fourteen, he went to Paris, and studied under the celebrated David. In 1798, he was settled on a farm in Pennsylvania by his father, but he did not distinguish himself as an agriculturist. In 1810, he sailed down the Ohio, with his wife and child, on a bird-sketching expedition. The following year, he visited Florida for a like purpose; and for many years he continued his ornithological researches among the American woods, to the neglect of his ordinary business. The latter he finally abandoned. After two years' further exploration of the forests of his native country, he came to Europe with the view to secure subscribers for

his work on *The Birds of America*. He met with a warm reception from such men as Herschel, Cuvier, Humboldt, Brewster, Wilson, and Sir Walter Scott. The issue of his work was soon commenced, each bird being delineated life-size. The colored engravings were executed chiefly by the late Mr. W. H. Lizars of Edinburgh. The work was completed in 87 parts, elephant folio, containing 448 plates. While the work was in process of publication abroad (it was finished 1839), A. visited America three times, for further researches. In 1831, he began the publication of his *American Ornithological Biography* in Edinburgh, also finished 1839. In 1839, A. finally returned to America, where, in 1844, he published a reduced edition of his works. Assisted by Dr. Buchanan, he published also *The Quadrupeds of America*, and a *Biography of American Quadrupeds*.

AUER, *ow'ér*, ALOIS: 1813, May 11—1869; July 10; b. at Wels, Upper Austria; trained in a printing establishment of his native town to be a compositor, corrector, and manager. During his few leisure moments, A. gained a knowledge of French, Italian, English, and other languages, in which he underwent an examination in 1835 and '36, before the Univ. of Vienna. His brilliant appearance on this occasion opened the way to the chair of Italian in the College at Linz. After travels in Germany, France, and England, he became director of the imperial state-press at Vienna, and in 1860 he was made a knight. He published a work showing the Lord's Prayer in 603 languages; a *Grammatical Atlas*, etc.; and in *Die Entdeckung des Naturselbstdrucks* (1864), he expounded his discovery of NATURE-PRINTING (q.v.). He also made improvements in typographical and mechanical processes.

AUERBACH, *ow'er-bâk*, BERTHOLD: popular German author, of Jewish extraction: 1812, Feb. 28—1882, Feb. 8; b. at Nordstetten, in the Wurtemberg Black Forest. He studied at Carlsruhe, Stuttgart, Tubingen, Munich, and Heidelberg. He early abandoned the study of Jewish theology and turned to literature; and is regarded by many as the greatest German writer of fiction. His first publication was on the relation of *Judaism and Modern Literature* (1836). His first novel, *Spinoza*, contained many suggestive philosophical thoughts, and bright sketches of Jewish life; it was followed by a translation of the works of Spinoza (5 vols. Stuttg. 1841). In the *Village Tales* (*Schwarzwälder Dorfgeschichten*, 1843) he showed his power in the charming portraiture of German peasant life; a second series appeared in 1848. *Auf der Höhe* (1865) has been pronounced the best novel in the German tongue. The *Village Tales* were translated into English, Swedish, and Dutch, and were generally admired. Among his works are *Schrift und Volk* (1846); *Das Landhaus am Rhein* (1869); *Wieder unser; Gedenkblätter zur Geschichte dieser Tage* (1871): Waldfried (1874). *Brigitta*, published in 1830, dealt with peasant-life in the style of his best village tales.

JOHN J. AUDUBON.

AUERBACH, Henry: b. 1482, at a place of the same name in Bavaria, the builder of the Auerbach court and cellar at Leipsic, mentioned in Goethe's *Faust*. The building was erected in 1530, and tradition reports that five years after Dr. Faust was seen riding out of it on a barrel of wine. This tale Goethe has made use of in his famous poem.

AUERBACH'S KEL'LER. See Auerbach, Henry.

AUERSPERG, Adolph Wilhelm Daniel, Prince: Austrian statesman: b. 1821, July 21; d. 1885, Jan. 5. From 1841–60 he served in the army, attaining the rank of major; in 1867 was elected to the Bohemian Diet by the Liberal landed proprietors; and in 1868 became a life member of the upper chamber of the Austrian Reichsrath. From 1870–71 he was governor of Salzburg and from 1871–79 was premier of the Austrian ministry. He was largely instrumental in carrying out electoral reforms, in securing direct elections to the lower chamber of the Reichsrath, and in strengthening the political entente with Hungary.

AUERSPERG, Anton Alexander: Austrian statesman and poet, known to literature as Anastasius Grün: b. Laibach (Carniola) 1806, April 11; d. 1876, Sept. 12. He was educated at Graz and Vienna; became distinguished as a Liberal through his verse; in 1848 was elected to the German preliminary Parliament; and subsequently became a member of the National Assembly. Under the constitution of 1861 the Emperor appointed him a member of the House of Lords and he there became prominent in opposing the Feudal-Clerical and Slowenian parties. During the year 1861–67 he was similarly active in the diets of Corniola and Styria. His most noteworthy publications were: *Der Letzte Ritter* (1830, new ed. 1885), a celebration of Maximilian I. in the metre of the *Nibelungen-Lied; Spaziergangen eines Weiner Poeten* (1831, new ed. 1835), an attack upon the Metternich régime; *Schutt* (1835); *Gedichte* (1837); *Volkslieder aus Krain* (1850); *Robin Hood* (1864), an adaption of the English ballad; and *In der Veranda: eine dichterische Nachlese* (1876). His poetry is contemplative, and the author's reflections at times completely overburden it, but its assertion of freedom was influential during the political controversy of that time. His *Gessammelte Werke* were edited by L. A. Frankl in 5 vols. (Berlin 1877). Consult Radics, *Anastasius Grün*, (Leipzig 1878).

AUERSTADT, *ow'ėr-stĕt*: a village in Saxony, famous for the great battle which took place there 1806, Oct. 14 between the French under Davoust, and the Prussian army under Duke Charles of Brunswick, which ended in a great victory for the former. The Prussians, who numbered 48,000, left nearly half of their men dead or wounded on the ground, while the French (30,000) escaped with a loss of only 7000. Napoleon made Davoust Duke of Auerstadt.

AU FAIT, a. *ō fā'* [F., in fact, indeed, in reality]: acquainted with; skilled in.

AUGEAN STABLE, n. *aw-jē'ăn stā'bl:* in Grecian Myth.: a stable belonging to *Augĕas*, or *Augeias*, son of Helios and Iphiboë (or Phorbas and Hermione) Augeas was king of Elis, and renowned for his wealth in oxen, of which he fed 3 000 head in his stables. After many years, in which these stables had never been cleaned, Hercules was commissioned by Eurystheus to cleanse them in one day, and was promised as payment a tenth part of the oxen. Hercules accomplished the task, by turning the courses of the rivers Peneus and Alpheus through the masses of ordure. When A. refused to pay the stipulated wages a war ensued, and A. was slain by Hercules Cleansing the A. stable is the type of a needed, but nearly impossible, reform.

AUGELITE, n. *aw'jĕl-īt* [Ger. *augelith*—from Gr. *augē*, bright light, radiance; suffix *ite*]: a colorless or pale-red mineral, with its lustre strongly pearly on cleavage surfaces. The composition is: phosphoric acid, 35·3; alumina, 49·15; water, 12·85, with some lime, iron, etc.

AUGER, n. *aw'gĕr* [AS. *naf gar*—from *nafa*, the nave of a wheel; *gár*, a piercer: Fin. *napa*, a navel, the middle of a thing]: an iron tool for boring holes.

AUGEREAU, *ōzh-rō'*, Pierre François Charles, Duke of Castiglione, Marshal and Peer of France, one of the most brilliant and intrepid of that band of general officers whom Napoleon gathered around himself: 1757, Oct. 21—1816, June 11; son of a tradesman. At the age of seventeen, he enlisted in the French carabiniers; afterwards was in the Neapolitan service till 1787, when he settled in Naples as a fencing-master. With other French residents, he was banished from that city in 1792, and immediately volunteered into the French revolutionary army intended for the repulsion of the Spaniards. His services were so conspicuous, that in less than three years he was made general of a division In 1795, he accompanied the army to Italy, where he greatly distinguished himself, especially in the field, but also in council. He gained much glory in the battles of Millesimo, Ceva, Lodi, Castiglione (for which he received his title), Roveredo, Bassano, etc. In 1797, he was appointed to command the Army of the Rhine; but a few months later he was transferred to be commander of the tenth division at Perpignan. This post he resigned in 1799, when he was elected as deputy in the council of the Five Hundred. In 1801, he received the command of the army in Holland; in 1804, he was made a marshal; in 1805, he commanded a division of the army which reduced the Vorarlberg; afterwards he was engaged at Wetzlar, Jena, Eylau; also in Italy (1809); Spain (1810); Berlin, Bavaria, and Saxony (1813).

AUGER-SHELL, n. *aw'gĕr-shĕl:* the English name of the shells belonging to the genus Terebra. It is given in consequence of their being long and pointed.

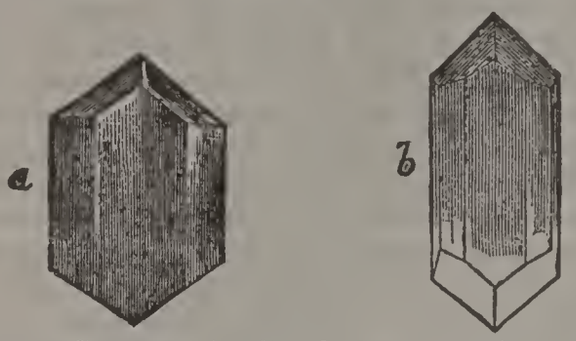
AUGHT, or Ought, n. *awt* [AS. *â-wiht;* Goth. *waihts*, a thing]: anything; a tittle or jot.

AUGIER, *ō'zhe-ā'*, GUILLAUME VICTOR EMILE: French dramatist; b. Valence, 1820, Sept. 17; educated for the profession of an advocate, but soon turned to literature, especially the drama. In 1844, he composed a piece in two acts, and in verse, entitled *La Ciguë*, which he offered to the Théâtre Français, but without success. The Odéon, however, received it, and it was played at that theatre with considerable applause for nearly three months. This is said to be the best of A.'s works, containing moral lessons, set in a framework of the antique, and made attractive by elegant versification. In the following year, the Théâtre Français sought his services, and he produced for that theatre his second comedy, entitled *Un Homme de Bien*, in three acts, and in verse—a comedy of the day, only partially successful. A third, *L'Aventurière*, 1848, was better received, but was thought too full of common place moralizing. *Gabrielle*, 1849, also highly moral, gained for its author the Monthyon prize. In 1852, he wrote *Diane;* in 1853, *La Pierre de Touche* (with Jules Sandeau); also *Philiberte*. After this time, his pieces belong to the comedy of intrigue. Such are *Le Mariage d'Olympe; Le Gendre de M. Poirïer*, written in partnership with Jules Sandeau; and *La Revanche de Georges Dandin*—all produced 1855; *La Jeunesse*, in 1858; *Les Lionnes Pauvres*, in the same year, written in conjunction with E. Foussier; and the *Beau Mariage*, also in conjunction with Foussier, in 1859. Either singly or with others, A. has also written *Les Effrontés*, *Le Fils de Giboyer*, *Maître Guérin*, *La Contagion*, *La Chasse au Roman*, *L'Habit Vert*, *Paul Forestier*, and *Sapho*—the last an opera, music by Gounod. In 1856, he published a small vol. of *Poésies*. Usually, A. is regarded as one of the leaders of the school of good sense; in his later pieces, however, approaching too much to the manner of the younger Dumas. In 1858, he was elected a member of the Académie Française, and was made a commander in the *Légion d'Honneur*. 1868. D. 1889, Oct. 25.

AUGITE, n. *aw'jīt* [Gr. *au'gē*, brightness]: aluminous var. of PYROXENE, a mineral very nearly allied to hornblende (q.v.), which has, indeed, by some mineralogists been regarded as a variety of it, though the distinction between them is important, as characterizing two distinct series of igneous rocks. AUGITIC, a. *aw-jĭt'ĭk*, pertaining to.

Augite consists of 47–56 per cent. of silica, 20–25 per cent. of lime, and 12–19 per cent. of magnesia, the magnesia sometimes giving place in whole or in part to protoxide of iron, and the varieties containing 2–15 alumina; some have a little soda or potassa, etc. Its specific gravity is 2·935–3·434. It is little or not at all affected by acids. It is usually of a greenish color, often nearly black. It crystallizes in six or eight-sided prisms, variously modified; it often occurs in crystals, sometimes imbedded, often in grains or scales. It is an essential component of many igneous rocks, particularly of basalt (q.v.), dolerite, and A.-porphyry (see PORPHYRY), from which chiefly it derives its importance as a mineral species. Augite Rock, consisting essentially of A. alone, occurs in the Pyrenees. A. is a common mineral in

trap-rocks. It is rarely associated with quartz, in which respect it differs from hornblende, but very often with labradorite, olivine, and leucite. Fluorine, generally present in small quantity in hornblende, has never been detected in A.



a, Common Augite; *b*, Green Augite.

The form of the crystals also is different in the two minerals, as well as their cleavage; but Prof. Gustav Rose of Berlin has endeavored to show that the difference between A. and hornblende arises only from the different circumstances in which crystallization has taken place, and that A. is the production of a comparatively rapid, and hornblende of a comparatively slow, cooling. He regards some of the varieties as intermediate. His views have been supported by experiments, and by a comparison of A. with certain crystalline substances among the scoriæ of foundries.—*Diopside*, *Sahlite*, and *Coccolite* are varieties of Pyroxene; also Diallage (q.v.), Hedenbergite, and other minerals.

AUGMENT, v. *awg-mĕnt'* [L. *augmen'tum*, an increase: F. *augmenter*, to increase—from L. *augĕō*, I increase]: to increase; to make or become large in size or extent. AUGMENT, n. *awg'mĕnt*, an increase; a prefix. AUGMENT'ING, imp. AUGMENT'ED, pp. AUGMENTABLE, a. *awg-mĕnt'ă-bl*, that may be increased. AUG'MENTA'TION, n. *-tā'shŭn*, an increase; the act of enlarging. AUGMEN'TATIVE, a. *-tă-tĭv*, having the power to augment: N. in *gram.*, opposite of diminutive. AUGMEN'TER, n. one who.—SYN. of 'augment, n.': increase; accession; augmentation; addition.

AUGMENTA'TION, in Heraldry: see HERALDRY.

AUGMENTA'TION, in Music: reproduction of a melody, or principal subject of a composition in the course of the progress of the piece, in notes of greater length than those notes in which the melody is first introduced. The tempo remains unaltered. A. is of great importance in the treatment of the subjects, or themes, for fugues, and properly used produces great effects.

AUGMENTA'TION, PROCESS OF, in Scotch Law: an action in the Court of Teinds (q.v.) by the minister of a parish against the titular, or beneficiary, and heritors, for the purpose of procuring an increase to his stipend.

AUGMENTA'TION COURT: court erected by King Henry VIII. for the increase of the revenues of his crown, by the suppression of monasteries.

AUGSBURG, *owgs'bôrg*: historically one of the most notable cities in Germany; in the angle between the rivers

Wertach and Lech; chief city of the circle of Swabia and Neuburg, in Bavaria. Though of an antique and rather deserted appearance, A. has numerous fine buildings, and especially one noble street, the 'imperial' Maximilian Strasse, adorned with bronze fountains. The industry of A. is reviving; several cotton and woolen factories are in operation, as well as manufactories of paper, tobacco, and machinery. Its gold and silver wares retain their ancient reputation. The art of copper engraving is extinct; but printing, lithography, and bookselling are important industries, and A. has become one of the leading centres of the book trade. For several years the *Allgemeine Zeitung*, the best known German newspaper, was published at A. (removed to Munich, 1882). Banking and stock-jobbing are extensively carried on; and it is still the emporium of the trade with Italy and s. Germany. It is the centre of a system of railways connecting it with Nürnberg and Leipsic, with Switzerland, Munich, etc. The foundation of A. was the 'colony' planted by the emperor Augustus, B.C. 12, after the conquest of the Vindelici, probably on the site of a former residence of that people. It was called *Augusta Vindelicorum*, whence the present name. It became the cap. of the province of Rhætia, was laid waste by the Huns in the 5th c., and came next under the dominion of the Frankish kings. In the war of Charlemagne with Thassilo of Bavaria it was again destroyed. After the division of Charlemagne's empire, it came under the Duke of Swabia; but, enriched by commerce, was able to purchase gradually many privileges, and became, 1276, a free city of the empire. It reached the summit of its prosperity by the end of the 14th c. About 1368 its aristocratic government was set aside for a democratic, which lasted for 170 years, till the aristocracy, favored by Charles V., regained the ascendancy. A. continued in great eminence for its commerce, manufactures, and art, till the war between Charles V. and the Protestant League of Schmalkald (1540). With Nürnberg, it formed the emporium of the trade between n. Europe and the south, and its merchants were princes whose ships were in all seas. See FUGGER. It was also the centre of German art, as represented by the Holbeins, Burkmair, Altdorfer, and others. Many diets of the empire were held in A., and the leading events of the Reformation are associated with its name. The discovery of the road to India by the Cape, and of America, turned the commerce of the world into new channels, and dried up the sources of A.'s prosperity. It lost its freedom with the abolition of the German empire in 1806, and was taken possession of by Bavaria. Pop. (1900) 89,109.

AUGSBURG CONFESSION: the chief standard of faith in the Lutheran Church. Its history is the following: With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V., as protector of the church, had convoked a diet of the empire, to meet at Augsburg, 1530, April 8, and had required from the Protestants a short statement of the

doctrines in which they departed from the Rom. Cath. Church. The Elector John of Saxony, therefore, in March, called on his Wittenberg theologians, with Luther at their head, to draw up articles of faith, to lay before him at Torgau. The commissioned doctors took as a basis, as far as pure doctrine was concerned, articles that had been agreed to the previous year at conferences held at Marburg and Schwabach, in the form of resolutions of the Lutheran reformers of Germany against the doctrines of Zwingli. These doctrinal articles with a supplement, and with a practical part added, were laid before the elector at Torgau. Melanchthon then, taking the Torgau articles as a foundation, with the advice of various Protestant theologians, as well as princes and other secular authorities, composed the document, which he first called an Apology, but which in the diet itself took the name of the Augsburg Confession. This work was begun at Augsburg in May. Luther was not present in Augsburg, being then under the ban of the empire, but his advice was had recourse to in its composition. The Torgau articles were in German; the Confession was both in German and Latin; and Melanchthon labored incessantly at its improvement till it was presented to the emperor, June 25. The character of Melanchthon, in the absence of Luther, had led him, in setting about the composition of the document, to aim at maintaining a spirit of love, forbearance, and mediation, as well as the utmost brevity and simplicity. Its object, which became gradually apparent only after the meeting of the diet, was, in the first place, to give a collected view of the belief of the Lutheran Protestants, aiming at the same time at refuting the calumnies of the Rom. Catholics, and at laying a foundation for measures of reconciliation.

The first part of the Confession contains 21 articles of faith and doctrine: 1. Of God; 2. Of Original Sin; 3. Of the Son of God; 4. Of Justification; 5. Of Preaching; 6. Of New Obedience; 7 and 8. Of the Church; 9. Of Baptism; 10. Of the Lord's Supper; 11. Of Confession; 12. Of Penance; 13. Of the Use of Sacraments; 14. Of Church Government; 15. Of Church Order; 16. Of Secular Government; 17. Of Christ's Second Coming to Judgment; 18. Of Free Will; 19. Of the Cause of Sin; 20. Of Faith and Good Works; 21. Of the Worship of Saints. The second and more practical part, with discussion at greater length, contains seven articles on disputed points: 22. On the Two Kinds of the Sacrament; 23. Of the Marriage of Priests; 24. Of the Mass; 25. Of Confession; 26. Of Distinctions of Meat; 27. Of Conventual Vows; 28. Of the Authority of Bishops.

This document, signed by some six Protestant princes and two free cities, was read before the emperor and the diet, 1530, June 25. Melanchthon, not looking upon the Confession as binding, began soon afterwards to make some alterations in its expression; at last, in 1540, he published a Latin Edition (*Confessio Variata*) in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view

to conciliation, he endeavored to unite the views of the Lutherans and Calvinists. This gave rise to much controversy; orthodox Lutheranism repudiated the alterations of Melanchthon, and long continued to subject his memory to great abuse; though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. It is not certain that the form of the Confession found in the Lutheran standards is identical with the unaltered Augsburg Confession, as the two original documents—German and Latin—laid before the diet have been lost. The chief distinction between the orthodox Lutherans and the reformed churches of Germany has all along been adherence to the 'unaltered' or to the 'altered' Confession. It was even a matter of controversy whether the 'reformed' were entitled to the rights secured to the Protestants by the Religious Peace of Augsburg, concluded 1555, on the ground of the 'unaltered' Confession.—Though the Augsburg Confession is still formally adhered to by the Protestant churches of Germany, it is confessedly no longer the expression of the belief of the vast majority of the members, after the great advances made by theology, and the many alterations in public opinion and feeling.

AUGS'BURG IN'TERIM: see INTERIM.

AUGUR, n. *aw'gẽr* [L. *augur*, an augur—probably from *āvis*, a bird; and *gur*, telling—from *garrĭō*, I talk idly]: among the anc. Romans, one who professed to tell future events by natural tokens, as the singing and flying of birds, and the flashing of lightning; a soothsayer: V. to profess to foretell events; to guess; to be a sign. AU'GURING, imp.: ADJ. engaged on conjectures; foreboding: N. the imaginary interpretations of signs. AUGURED, pp. *aw'gẽrd*. AU'GURSHIP, n. the office or dignity. AUGURAL, a. *aw'gū-răl*, or AUGU'RIAL, *-rĭ-ăl*, pertaining to. AUGUROUS, a. *aw'gū-rŭs*, foreboding; predicting. AUGURATE, v. *aw'gū-rāt*, to predict. AU'GURA'TING, imp. AU'GURA'TED, pp. AUGURY, n. *aw'gū-rĭ*, or AUGURATION, n. *aw-gŭr-ā'shŭn*, the art of foretelling events by the flights of birds; an omen or prediction. AUGURIST, n. *aw'gŭr-ĭst*, one who practices augury; an augur.—SYN. of 'augur, v.': to presage; forebode; betoken; prognosticate; portend; predict.

AU'GURIES and AU'SPICES: omens of future events The entire religious and political life of the early Romans was deeply penetrated by the influence of their superstitions, among which auguries and auspices held a prominent place.

Like almost all primitive nations, the Romans believed that every unusual occurrence had a supernatural significance, and contained, hidden in it, the will of Heaven regarding men. To reveal or interpret this hidden will was the exclusive privilege of the augur, who apparently derived his official designation, in part at least, from *avis*, a bird; while Roman history abundantly proves that the observation of the flight of birds was the principal means adopted for discovering the purpose of the gods. It was not, however, any one who could be appointed an augur. The gods selected their own interpreters—that is to say,

they conferred the divine gift upon them from their very birth; but an educational discipline also was considered necessary; hence a 'college of augurs' figures in the very dawn of Roman history. Romulus, it is almost certain, was an augur. He is said to have been skilled in the art of divination from his youth; and by 'divination' we must specially understand augury; for the Romans, with patriotic piety, held all the forms of divination practiced in other countries to be useless and profane. Previous to the Ogulnian law, passed B.C. 307, there were only four augurs, selected from the patricians. By this law, however, the plebeians became eligible for the pontificial or augural offices, and five were immediately created. For more than two hundred years, the number continued the same, till Sulla, B.C. 81, increased it to fifteen. Finally, in the first days of the empire, when all parties, tired of the long civil wars, hurried to throw their privileges at the feet of the monarch who had brought peace into their homes, the right of electing augurs at his pleasure was conferred on Augustus, after which the number became indefinite.

At first, the augurs were elected by the *Comitia Curiata;* but as the sanction of the former was necessary to give validity to the acts of the latter, they could always 'veto' any elections which were obnoxious to them; so that the power of electing members to fill up vacancies naturally fell into the hands of the college itself, and so continued till B.C. 103, when a tribune of the people named Ahenobarbus carried a law by which it was enacted that for the future vacancies in the augural and pontifical offices should be filled not by those religious corporations themselves, but by a majority of certain picked tribes. This new law was occasionally repealed and re-enacted during the civil wars which lasted till the time of Augustus. The scramble for power, however, during these political vicissitudes, as well as the general advance of knowledge, had rendered its prophetic pretensions ridiculous in the eyes of educated people. By Cicero's time, it had lost its religious character altogether, but was still regarded as one of the highest political dignities, and coveted for the power it conferred.

The modes of divination employed by the augurs were five in number—*augurium ex cœlo, ex avibus, ex tripudiis, ex quadrupedibus, ex diris.* The *first,* relating to the interpretation of the celestial phenomena, such as thunder and lightning, was apparently of Etruscan origin, and held to be of supreme significance. The *second* related to the interpretation of the noise and flight of birds. Not every bird, however, could be a sure messenger of the gods. Generally speaking, those 'consulted,' as it was called, were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites,* or birds whose *flight* revealed the will of the gods; the last four to the class of *oscines,* whose voice divulged the same. These two modes of augury were the oldest and most important. Of the other three, the auguries *ex tripudiis* were taken from the feeding of chickens; the auguries *ex quadrupedibus,* from four-footed animals—as, for instance, if a dog, or wolf, or hare, ran across the path

of a Roman, and startled him by any unusual motion, he mentioned it to an augur, who was expected to be able to advise him what to do; the auguries *ex diris* (a vague kind of augury), from any trivial accidents or occurrences not included in the previous four—such as sneezing, stumbling, spilling salt on the table, etc.

At Rome, the auspices were taken on the summit of the Capitoline Hill; and the ground on which the augur stood was solemnly set apart for the purpose. The latter then took a wand, and marked out a portion of the heavens in which his observations were to be made. This imaginary portion was called a *templum* (hence *contemplari*, to contemplate), and was subdivided into right and left. According as the birds appeared in either of these divisions were the auspices favorable or unfavorable. How vast were the political influence and authority of the augurs is seen from the fact, that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, king, consul, dictator, or pretor, every civic officer, every religious functionary, was invalid if the auspices were unfavorable. No general could lawfully engage in battle—no public land could be allotted—no marriage or adoption, at least among the patricians, was held valid—unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by the veto of any member of the augural college.

The two terms, auguries and auspices are generally used as synonymous. But a slight difference is perceptible; not the augurs only, but the chief magistrates of Rome (inheriting the honor from Romulus), held the 'auspices,' while the 'auguries' were exclusively in possession of the augurs; but the mode of divination, and the end to be obtained by it, seem to have been the same in both cases.

The power of taking the auspices in war was confined to the commander-in-chief; and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase 'under the auspices' of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name.

AUGUST, a. *aw-gŭst'* [L. *augustus*, sacred, majestic: It. *augusto*; F. *auguste*]: majestic; grand; inspiring awe. AUGUST'NESS, n. dignity of appearance; grandeur in mien. AUGUST'LY, ad. *-lĭ.*—SYN. of 'august': grand; great; sublime; noble; majestic; imposing; magnificent; stately; splendid; superb; solemn; awful.

AUGUST, n. *aw'gŭst:* sixth month in the Roman year, which began with March; it was originally styled *Sextilis*, and received its present name from the emperor Augustus on account of several of the most fortunate events of his life having occurred during this month. On this month he was first admitted to the consulate, and thrice entered the city in triumph. On the same month, the legions from the Janiculum placed themselves under his auspices, Egypt was brought under the authority of the Roman

people, and an end put to the civil wars. (See Macrobius, i. 12.) As the fifth month, or *Quintilis*, had previously been styled Julius in honor of Julius Cæsar, a day was taken from February to make A. equal with July.— AUGUSTAN, *a. aw-gŭs'tăn*, pertaining to Augustus or his age; literary or refined.

AUGUSTA, *aw-gŭs ta:* capital of Richmond co., Ga., at the head of navigation on the Savannah river, 132 m. n. w. of Savannah; the third city in Georgia in wealth and population. There are several lines of railroad entering the city, among them the Central of Georgia, Charleston and West Carolina, the Georgia, the Southern, and the South Carolina and Georgia. The city is situated on a beautiful plain, with wide, straight streets, one of which, Green street, is 168 ft. broad, and beautifully shaded. The chief industry is cotton manufacture, and there are also manufactories of cotton-seed oil, lumber and wood products, flour, iron goods, brick and tile, drain pipe and sash, door and blinds. There is also a large shipping trade in lumber, fruit and vegetables. Among the educational institutions are the Georgia Medical College, a branch of the State University at Athens, St. Mary's and Sacred Heart Academies (Rom. Cath.), Paine's Institute for Colored Students, Richmond Academy, lately put under the care of the State University, high schools for white and colored youth and grammar, intermediate and primary schools for white and colored children. There are a public library of about 10,000 volumes, an orphan asylum, two public hospitals, a juvenile reformatory, and the Louise King Home. The prominent buildings are the Masonic Temple, Odd Fellows' Hall, Chamber of Commerce, city hall, cotton exchange, a United States arsenal and others. There are several parks chief of which is May Park, 11 acres, and numerous churches, cemetery and fair grounds in the suburbs, two handsome monuments—one to the Georgia signers of the Declaration of Independence and the other to the Confederate dead—electric street railway system, several banks, daily and weekly newspapers; a fine system of sewage, and the canal and water-works system are operated by the municipality. A. being about 150 ft. above sea-level, has become well known as a health resort for pulmonary invalids because of its dry, invigorating atmosphere. Summerville, a suburb on the Sand Hills, 400 ft. above A. is particularly well known as a health resort. The city was founded in 1736 by Gen. J. E. Oglethorpe (q. v.), the founder of Georgia and named in honor of the Princess Augusta of Saxony, favorite daughter of George II. and mother of George III. During its early history A. was the most important trading post in Georgia and one of its most important military posts. Many conferences with the Cherokees, Creeks and Choctaws were held here and

under the treaties of 1763 and 1773 large tracts of land were ceded to the whites by the Indians. In 1779, Jan., the city was captured by the British and held for a month; in 1780, May, was again captured by the British and Loyalists and held until 1781, June 5 when it was captured by the American forces under Gen. Andrew Pickens and 'Light Horse' Harry Lee. In 1778 it was made the state capital and remained such till 1798; was incorporated as a town 1798 and as a city 1817. Under the revised charter of 1882, the government consists of a mayor elected for 3 years, and city council of 15 members one third of whom are elected each year for 3 years. Pop. (1910) 41,040.

AUGUSTA: city, county-seat of Kennebec co., and capital of Maine; mainly on the w. bank of the Kennebec river about 40 m. from its mouth; at the head of tidal navigation on the Maine Central railroad; 63 m. n. e. of Portland and 74 m. s. w. of Bangor. It is connected with neighboring cities by electric railway and with Portland, Boston and other places by steamer. The Kennebec, across which there is a dam just above the city, furnishes excellent water-power for the manufacturing establishments which include cotton factories, boot and shoe, sash and blind, and other factories. lumber mill and paper and pulp mill. The city contains the State Capitol, Maine Insane Hospital, City Hospital, public library, and the State Library, city hall, county buildings, post-office, the United States arsenal, numerous churches, public schools and banks. A. was first permanently settled in 1754 by the Plymouth Company, who established a fort here, named Fort Western. Later the village was known as Cushnoc; in 1771 was incorporated under the name of Hallowell; in 1797 a new town was created from a part of Hallowell, first named Harrington and then Augusta. A. became the capital of the state 1831 and received its city charter 1849. The city government is vested in a mayor and a city council, consisting of boards of aldermen and common council. Pop. (1910) 13,211.

AUGUSTA, Maria Louisa Catherine, Queen of Prussia, Empress of Germany; b. 1811, Sep. 3; d. 1890. Daughter of Charles Frederic, Grand Duke of Saxe Weimar, her mother being a daughter of Paul I. of Russia. The princess having been educated at the court of her grandfather, Charles Augustus, Grand Duke of Saxe Weimar, intimate friend of Goethe, Wieland, and other men of letters resident at Weimar, made their acquaintance, and was on familiar terms in particular with the great German poet, Goethe. Augusta married William, Prince of Prussia, 1829, June 11, and by this marriage became afterwards the queen of Prussia, and in 1871, empress of Germany. The empress had but two children, the crown prince of Germany, who married the princess royal of England, and the princess Louisa.

AUGUSTINE, *aw'gŭs-tĭn*, AURELIUS, ST.: greatest of the Latin fathers of the church; 354, Nov. 13—430, Aug. 28; b. Tagaste, a town of Numidia. A. was sent to school at Madaura and at Carthage.

The energy and penetration of intellect exhibited by the young A. excited the most flattering hopes. But strong as A. was, the temptations of Carthage were stronger. His nature, deep, impetuous, passionate, thirsted for excitement. He had just reached the age when happiness is conceived to be synonymous with pleasure, and Carthage, the second city of the empire, was rank as Rome in its sensual corruptions. A. fell. Before he had reached his eighteenth year, his mistress bore him a son, who was named Adeodatus—afterwards baptized along with him at Milan. The thing which appears to have first stirred his deeper being into life was a passage which he suddenly came across in the *Hortensius* of Cicero, treating of the worth and dignity of philosophy. To use the language of Neander: 'The conflict now began in his soul which lasted through eleven years of his life. As the simplicity of the sacred Scriptures possessed no attractions for his taste—a taste formed by rhetorical studies and the artificial discipline of the declamatory schools—especially as his mind was now in the same tone and direction with that of the emperor Julian, when the latter was conducted to the Platonic theosophy; as, moreover, he found so many things in the doctrines of the church which, from want of inward experience, could not be otherwise than unintelligible to him, while he attempted to grasp, by the understanding from without, what can be understood only from the inner life, from the feeling of inward wants, and one's own inward experiences; so, under these circumstances, the delusive pretensions of the Manichæan sect, which, instead of a blind belief on authority, held out the promise of clear knowledge and a satisfactory solution of all questions relating to things human and divine, presented the stronger attractions to his inexperienced youth.' A. now became a professed Manichæan. Returning to his native town, he lectured for a short time on 'grammar'—that is to say, on literature. Soon afterwards, he returned to Carthage, to pursue his profession under more favorable auspices. Here he wrote, in his twenty-seventh year, his first work, *De Apto et Pulchro*—a treatise on æsthetics, unfortunately lost. About the same time his spiritual nature became keener and more imperative in its demands. The futile speculations of the visionary sect to which he had attached himself now became apparent. He had a series of interviews and conversations with Faustus, one of the most celebrated teachers of Manichæism; and these so utterly disappointed his expectations, that he left the society in disgust and sad bewilderment, after having wasted ten years in a fruitless search for wisdom and truth.

In 383, he went to Rome, but after a short stay left Rome, and proceeded to Milan, where he became a teacher

of rhetoric. No change could have been more fortunate. At this time the bishop of Milan was the eloquent and devout St. Ambrose. An intimacy sprung up between the two. A. often went to hear his friend preach, and these eloquent discourses, combined with a fuller study of the Scriptures, converted A. to the orthodox faith. In the eighth and ninth books of his *Confessions*, he has left a noble though painful picture of his inward life during this momentous crisis. It is sufficient to say that the Spirit of God triumphed. A., with his natural son, Adeodatus, of whom he seems to have been justly fond, was baptized by Ambrose at Milan, 387, April 25. Shortly afterwards he returned home. After his mother's death, and before leaving Italy for Africa, A. wrote his treatises, *De Moribus Ecclesiæ Catholicæ et de Moribus Manichæorum; De Quantitate Animæ;* and *De Libero Arbitrio.* It is unnecessary to relate at any length the subsequent life of Augustine. He retired into private life, and composed several treatises—*De Genesi Contra Manichæos, De Musicâ, De Magistro*, and *De Verâ Religione*, which secured him high reputation. In 391, he was ordained a priest by Valerius, Bishop of Hippo; and during the next four years, though earnestly engaged in the work of preaching, contrived to write three different works. In 395, he was made colleague of Valerius. Then ensued a period of strife, known in church history as the Donatist and Pelagian controversies. A., having passed through so fierce a fire of personal experience on religious questions, was very jealous both of what he *knew* to be the truth, and of what he only *thought* to be the truth. This, added to his acute and profound intellect, made him, in spite of the lack of historical erudition, a most formidable and relentless antagonist. For this portion of his career see PELAGIUS: PELAGIANISM. In 397, appeared his *Confessiones*, in 13 books. In 413, he commenced his *De Civitate Dei*, and finished it 426. It is generally considered his most powerful work. In 428, A. published his *Retractationes* in which he makes a recension of all his previous writings. It is a work of great candor. He frankly acknowledges such errors and mistakes as he had discovered himself to have committed, explains and modifies numerous statements, and modestly reviews his whole opinions. His end was now drawing nigh. In 429, the Vandals, under the barbarian Genseric, landed in Africa; next year they besieged Hippo. He died in the third month of the siege.

No mind has exerted greater influence on the church than that of Augustine. Consistency of theological opinion is not to be looked for from him, nor from any of the church fathers. A larger sphere of freedom was permitted to religious speculation in those unfettered days, before creeds were encircled with that traditionary sanctity that they now possess. Nevertheless, there is little difficulty in determining the central tenets of his theological belief. He held the corruption of human nature through the fall of man, and the consequent slavery of the human will. Both

on metaphysical and religious grounds, he asserted the doctrine of predestination, from which he necessarily deduced the corollary doctrines of election and reprobation; and finally, he strenuously supported, against the Pelagians, not only these opinions, but also the doctrine of the perseverance of the saints. At the same time, it is but fair to add that, even on such points, his language is far from uniform; that much of the severity of his doctrines arose from the bitter and painful remembrance of his own early sins, and from the profound impression which the corrupt state of society in his time, and the vast desolations of barbarism, had made on his earnest and susceptible soul; and that, in his desire to give glory to God, he sometimes forgot to be kind or even just to man. In illustration of this may be mentioned the fact (see Neander, Mosheim, and Waddington's Church Histories) that the maxim which justified the chastisement of religious errors by civil penalties, even to burning, was established and confirmed by the authority of A., and thus transmitted to following ages. In his epistle to Dulcitius, a civil magistrate who shrank from putting in force the edict of Honorius against heretics, he uses these words: 'It is much better that some should perish by their own fires, than that the whole body should burn in the everlasting flames of Gehenna, through the desert of their impious dissension.' In the opinion of Neander, it was to the somewhat narrow culture, and the peculiar personal experience and temperament of Augustine, that the doctrines of absolute predestination and irresistible grace, first systematized by him, owed much of that harshness and one-sidedness which so long obstructed their general reception by the church, and which continue to render them repulsive to multitudes. A.'s philosophical doctrines can be summarized as follows: Against the skepticism of the Academics he holds that man needs certainty of knowledge for his happiness. Doubt and the mere search after truth cannot suffice. In our own mental states we have given us unquestionable facts, and from any admitted truth whatsoever we can infer the existence of God, the perfect truth; whereas the existence of the material world about us is only an object of faith.

God created the world out of nothing; and he did so directly without the agency of demigods, demons, or angels (as Neoplatonism taught). He exists apart from the world, yet is creatively present throughout the world. The world is not eternal, only God and the souls of angels and of men are.

Against the Manichæans, who held that good and evil are both fundamental in the world's constitution, A. taught that the good alone is fundamental, and that evil is only a negation or absence of the good, due to the fact that the objects of the world are finite.

A.'s works have been repeatedly edited in recent times. A large edition appeared at Paris (1835–40). Numerous editions of the *Confessiones* and the *De Civitate Dei* have

SAINT AUGUSTINE.
354 A.D.—430 A.D.

appeared. Translations of his works into English, edited by Dods, were published at Edinburgh (15 vols. 1871–77); also in Schaff's *Library, Nicene and Post-nicene Fathers*, Vols. I-VIII. On A. consult Cunningham, *St. Augustine and His Place in the History of Christian Thought* (London 1886); McCabe, *St. Augustine and His Age* (London 1902).

AU'GUSTINE, St., first Abp. of Canterbury: d. 604: was originally a monk in the convent of St. Andrew at Rome. In 596 he was sent, with forty other monks, by Pope Gregory I., to convert the Anglo-Saxons to Christianity, and establish the authority of the Roman see in Britain. In the spring of 597 the missionaries landed on the Island of Thanet. The missionaries were kindly received by Ethelbert, King of Kent, whose wife Bertha, daughter of the king of the Parisians, was a Christian, and retained a Frankish bishop in her suite as chaplain. A residence was assigned to them at Canterbury, then called *Durovernum*, where they devoted themselves to monastic exercises and preaching. The conversion and baptism of the king contributed greatly to the success of their efforts among his subjects, and it is recorded that in one day A. baptized 10,000 persons in the river Swale.

In 597, he went to Arles, by direction of the pope, and was there consecrated Abp. of Canterbury and Metropolitan of England. On his return, he despatched a presbyter and monk to Rome, to inform the pope of his success, and obtain instruction on certain questions; Gregory's advice with regard to the propagation of the faith are admirable examples of that pious ingenuity which has often characterized the missionary policy of the Catholic Church. Thus, instead of destroying the heathen temples, A. was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. Saint Augustine was a zealous missionary of the Church and labored with untiring energy to extend the authority of the Church and to convert the ancient Britons, whom the English had driven into the mountains of Wales. In this, however, he was only partially successful, some of the British bishops refusing to acknowledge his authority and to unite with the English Church. A.'s subsequent efforts to establish his authority over the native British church were not so successful as his missionary labors. He was buried in the churchyard of the monastery bearing his name, founded by King Ethelbert. His body was removed to the cathedral of Canterbury, 1091. Bebe's *Historia Ecclesiastica Gentis Anglorum* is the great authority for the life of St. Augustine. A thoughtful and pleasing sketch of it is in the Rev. Arthur P. Stanley's *Historical Memorials of Canterbury*, Lond. 1855.

The site and remains of St. A.'s monastery were purchased, 1844, by Mr. Beresford Hope, by whom they were presented to the Abp. of Canterbury in trust, for the erection of a missionary college in connection with the

Church of England. This institution was incorporated by royal charter, 1848. The buildings, in which as much of the ancient structure as possible has been preserved, have accommodation for about 45 students, whose course of study extends over three years. Twenty exhibitions have been founded in connection with the college.

AUGUSTINS, n. plu. *aw-gŭs'tĭnz*, or AUGUSTINES: monks who follow the doctrines and rules of St. Augustine. AUGUSTINIAN, n. *aw'gŭs-tĭn'ĭ-ăn*, one of an order of monks so named; one who holds with St. Augustine that grace is absolutely effectual from its inherent nature.

AUGUS'TINS, or AUGUS'TINES, or AUGUSTIN'IANS: names of several religious bodies in the Rom. Cath. Church. Whether St. Augustine ever framed any formal rule of monastic life, is uncertain; but one was deduced from his writings, and was adopted by as many as thirty monastic fraternities, of which the chief were the Canons Regular, the Knights Templars (q.v.), the Begging Hermits, the Friars Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The CANONS REGULAR OF ST. AUGUSTINE, or AUSTIN CANONS, appear to have been founded or remodelled about the middle of the 11th c. Their discipline was less severe than that of monks properly so-called, but more rigid than that of the secular or parochial clergy. They lived under one roof, having a common dormitory and refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. In England, where they were established early in the 12th c., they had about 170 houses, the earliest, it would seem, being at Nostell, near Pontefract, Yorkshire. In Scotland, they had about 25 houses: the earliest at Scone was founded 1114, and filled by canons from Nostell; the others of most note were at Inchcolm in the Firth of Forth, St. Andrews, Holyrood, Cambuskenneth, and Inchaffray.

The BEGGING HERMITS, HERMITS OF ST. AUGUSTINE or AUSTIN FRIARS, were a much more austere order, renouncing all property, and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the 11th and 12th c., existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV., about the middle of the 13th c., imposed on them the rule of St. Augustine, whom they claimed as their founder. In 1256, Pope Alexander IV. placed them under the control of a superior or president called a 'general.' In 1287, a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570, Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence the were called *discalceati* or 'barefooted friars.'

The degeneracy of the order in the 14th c. called into

existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged But in his day even these had fallen victims to the general corruption of the priesthood, and he inflicted serious injury upon it by his unsparing denunciations. After the French Revolution, the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and s. Germany. It was diminished even in Austria and Naples. It is most powerful in Sardinia and America.

The name of AUGUSTINES was given also to an order of nuns who claimed descent from a convent founded by St. Augustine at Hippo, and of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. The Hôtel-Dieu at Paris is still served by them.

AUGUSTOWO, *ow-gôs-tō'vō:* town of Poland, cap. of a circle of the same name: on the Netta, a feeder of the Bug; 138 m. n.e. from Warsaw. It was founded by Sigismund Augustus, King of Poland, 1557. It has woolen and linen manufactures, and some trade in horses and cattle. Great part of the surrounding districts is occupied by lakes and marshes, or covered with forests. Pop. 12,000.

AUGUSTULUS, *aw-gŭs'tū-lŭs,* ROMULUS: the last emperor of the western portion of the Roman empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential littleness of his character. He was the son of Orestes, a Pannonian of birth and wealth, who rose to high rank under the emperor Julius Nepos, whose favor he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the emperor, Orestes conferred the vacant throne on his son A. (476), retaining all substantial power in his own hands. Orestes failing to conciliate the barbarians, who had helped him against Nepos, with a grant of the third of the lands of Italy, they, under the command of Odoacer, besieged him in Pavia, and capturing, put him to death. A. yielded at once, and being of too little consequence to be put to death, he was dismissed to a villa near Naples with an annual pension of 6,000 pieces of gold.

AUGUSTUS.

AUGUSTUS, *aw-gŭs'tŭs*, Caius Julius Cæsar Octavianus: B.C. 63, Sep. 23—A.D. 14, Aug. 19; son of Octavius and Atia (dau. of Julia, younger sister of Julius Cæsar). The Octavian family came originally from Velitræ, in the country of the Volsci; and the branch from which A. descended was rich and honorable. His father had risen to the rank of senator and pretor, but died in the prime of life, when A. was only four years old. A. was carefully educated in Rome under the guardianship of his mother and his step-father, Lucius Marcius Philippus. At the age of 12, A. delivered a funeral oration over his grandmother; at 16, he received the toga virilis. The talents of the youth recommended him to his grand-uncle, Julius Cæsar, who adopted A. as his son and heir. At the time of Cæsar's assassination (B.C. 44, March 15), A. was a student under the celebrated orator Apollodorus, at Apollonia in Illyricum, where, however, he had been sent chiefly with a view to gain practical instruction in military affairs. He returned to Italy, assuming the name of Julius Cæsar Octavianus, and at his landing at Brundusium was welcomed by deputies from the veterans there assembled; but declining their offers, he chose to enter Rome privately. The city was at this time divided between the two parties of the republicans and the friends of Mark Antony; but the latter had, by adroit maneuvers, gained the ascendency, and had almost absolute power. A. was at first haughtily treated by the consul, who refused to surrender the property of Cæsar. After some fighting, in which Antony was worsted, and had to flee across the Alps, A., who had made himself a favorite with the people and the army, succeeded in getting the will of Julius Cæsar carried out. He found an able friend and advocate in Cicero, who had at first regarded him with contempt. The great orator, while imagining that he was laboring in behalf of the republic, was in fact only an instrument for raising A. to supreme power. When Antony returned from Gaul with Lepidus, A. joined them in establishing a triumvirate. He obtained Africa, Sardinia, and Sicily; Antony, Gaul; and Lepidus, Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy, and by victories over the republican army in Macedonia, commanded by Brutus and Cassius. After the battle of Philippi, won by A. and Antony, of which the former unjustly claimed all the credit, whereas it mainly belonged to the latter, the triumvirs made a new division of the provinces—A. obtaining Italy, and Lepidus Africa. The Perusian war, excited by Fulvia, wife of Antony, seemed likely to lead to a contest between A. and his rival; but was ended by the death of Fulvia, and the subsequent marriage of Antony with Octavia, sister of Augustus. Shortly afterwards, the claims of Sextus Pompeius and Lepidus having been settled by force and fraud, the Roman world was divided between A. and Antony; and a contest for supremacy commenced between them. While Antony was lost in luxurious dissipation at the court of Cleopatra, A. was industriously striving to gain the love and confidence of

THE AGE OF AUGUSTUS.

the Roman people, and to damage his rival in public estimation. At length war was declared against the queen of Egypt, and at the naval battle of Actium (q.v.), B.C. 31, A. was victorious, and became sole ruler of the Roman world. Soon afterwards, Antony and Cleopatra ended their lives by suicide. The son of Antony by Fulvia, and Cæsarion, son of Cæsar and Cleopatra, were put to death; and in B.C. 29, after disposing of several affairs in Egypt, Greece, Syria, and Asia Minor, A. returned to Rome in triumph, and closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favor, he abolished the laws of the triumvirate, adorned the city of Rome, and reformed many abuses. At the end of his seventh consulship (B.C. 27), he proposed to retire from office, in order that the old republican form of government might be re-established, but he was ultimately induced to retain his power. Hitherto, since Cæsar's death, the consul had been named Octavian; but now the title of *Augustus* (meaning 'sacred' or 'consecrated') was conferred on him. In the eleventh consulship of A. (B.C. 23), the tribunitian power was conferred on him for life by the senate. Republican names and forms still remained, but they were mere shadows. A. was in all but name absolute monarch. In B.C. 12, on the death of Lepidus, he had the high title of Pontifex Maximus, or High Priest, bestowed on him. The nation surrendered to him all the power and honor that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, etc., A. (B.C. 9) suffered the greatest defeat he had sustained in his long career, in the person of his general, Quintilius Varus, whose army was totally destroyed by the Germans.

This loss so afflicted A., that for some time he allowed his beard and hair to grow, as a sign of deep mourning, and often exclaimed: 'O Varus, restore me my legions!' From this time A. confined himself to plans of domestic improvement and reform, and so beautified Rome, that it was said, 'A. found the city built of bricks, and left it built of marble.' He also founded cities in several parts of the empire; and altars were raised by the grateful people to commemorate his beneficence; while, by a decree of the senate, the name Augustus (August) was given to the month Sextilis.

Though surrounded thus with honor and prosperity, A. was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He had no son, and Marcellus, the son of his sister, and Caius and Lucius, the sons of his daughter, whom he had appointed as his successors and heirs, as well as his favorite step-son Drusus, all died early; while his step son Tiberius was an unamiable character whom he could not love. Age, domestic sorrows, and failing health warned him to seek rest; and, to recruit his strength, he undertook a journey to Campania; but his infirmity increased, and he died at Nola in the 77th year of his age. According to tradition, shortly before his death, he called for a mirror,

arranged his hair neatly, and said to his attendants: 'Have I played my part well? If so, applaud me!' A. had consummate tact and address as a ruler and politician, and could keep his plans in secrecy while he made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by A. himself. He encouraged agriculture, patronized the arts and literature, and was himself an author; but only a few fragments of his writings have been preserved. Horace, Virgil, and all the most celebrated Latin poets and scholars were his friends. His was the *Augustan Age* of literature. His death threw a shade of sorrow over the whole Roman world; the bereaved people erected temples and altars to his memory, and numbered him among the gods.

AUGUS'TUS, Elector of Saxony: 1526, July 31—1586, Feb. (ruled 1553–86); son of Duke Henry the Pious, and of Katherine of Mecklenburg; b. at Freiberg, then the seat of his father's court. In 1548, he married Anna, daughter of Christian III. of Denmark, who was universally popular for her devoted adherence to Lutheranism and her domestic worth. After the death of his brother, Maurice, 1553, A. succeeded to the electorate. His rule is noticeable chiefly as bearing upon the history of the newly established Protestant Church. Equally intolerant and inconsistent in his theology, A. first used his utmost influence in favor of the Calvinistic doctrine of the sacraments; and then, 1574, adopted the Lutheran tenets, and persecuted the Calvinists. On the other hand, however, it must be owned, to his honor, that, by his skilful internal administration, he raised his country far above the level of any other in Germany, introducing valuable reforms in jurisprudence and finance, and giving a decided impetus to education, agriculture, manufactures, and commerce. He even wrote a book on the management of orchards and gardens, and commanded that every newly-married pair should, within the first year of their marriage, plant two fruit-trees. The Dresden Library owes its origin to him, as do also most of its galleries of art and science. His own favorite private pursuit was that of alchemy, in which the Electress Anna took part. In 1586, Jan.—the electress having died in the previous year—A. married a young princess of Anhalt, but died a month after, and was buried in the cathedral of Freiberg. He was succeeded by his son, Christian I.

AUGUS'TUS II., Frederick, commonly called the Strong. Elector of Saxony, King of Poland: 1670–1733, Feb.; b. Dresden; second son of the elector John George III. and of the Danish princess Anna Sophia. His extraordinary strength was developed by a careful physical education, and his mental faculties more successfully cultivated than his morals. From 1687 to 1689 he travelled over the greatest part of Europe, but was prohibited by his father from visiting Rome. Upon his father's death (1691), he went to Vienna, and there formed an intimacy with Joseph, King of Rome, which materially influenced his politics. When, in 1694, he succeeded to his brother George

as elector, instead of turning his arms against France, according to previous arrangement, he undertook the command of the Austro Saxon army against the Turks in Hungary. After the battle of Olasch, 1696, he returned to Vienna as a candidate for the throne of Poland, vacated by John Sobieski. Bidding higher than Prince Conti for the crown (10,000,000 Polish florins), and adopting the Rom. Cath. faith, he was elected king by the venal nobles; and having, by his imposing force, awed the adherents of Conti, he was crowned at Cracow, 1697, Sep. 15. Ascending the throne, he promised to regain, for his new kingdom the provinces that had been ceded to Sweden; but his efforts to do this only led to the defeat of himself and his allies, his own deposition as king of Poland, the election of Stanislaus Leszcynski, and the ignominious peace of Altranstädt, 1706. So complete was his humiliation, that A. was compelled to send a letter of congratulation to the new Polish king, together with all the crown-jewels and archives. However, on receiving intelligence of the defeat of Charles XII. at Pultowa, 1709, he declared the treaty of Altranstädt annulled, marched with a powerful army into Poland, formed a fresh alliance with the czar, and recommenced a war with Sweden, which continued with fury, till the death of Charles XII. at Frederickshall, 1718, gave a new aspect to affairs, leading first to a truce, and eventually to a peace with Sweden. Meanwhile, a confederation, headed by a Polish nobleman, had been formed against the Saxons, and repulsed them with much success, till, in 1716, through the mediation of the czar, a compact was made between the Poles and A., agreeably to which the Saxon troops left the kingdom. The king now found himself obliged to employ conciliation, and the splendor of his dissolute court soon won the favor of the Polish nobles, who followed his example but too closely. Saxony had bitter cause to regret the union of the crowns. Its resources were shamefully squandered, even when want and famine were in the land, on the adornment of the capital, on the king's mistresses, his illegitimate children, and the alchemists who deluded him with hopes of the elixir of life. A. supported the fine arts as ministering to luxury, but did little for the cause of science. Despotic in principle, though easy in temper; ambitious as well as luxurious; reckless alike in the pursuit of war and pleasure, death overtook him in the midst of projected festivities. On his way to the Warsaw diet, gangrene of an old wound set in, he died, and was buried at Cracow. By his wife—a Protestant, dau. of the Margrave of Brandenburg-Kulmbach—he left an only son, who succeeded to him. The most celebrated of his numerous illegitimate offspring—amounting, it is affirmed, to somewhere about 300—was Maurice, Count of Saxony

AUGUSTUS III., Frederick, Elector of Saxony, King of Poland: 1696, Oct.—1763; the son and successor of Augustus II.; carefully educated by his mother in the Protestant faith. At the age of fifteen, however, he left her tutelage for a tour through Germany, France, and Italy, where he changed his religion, secretly professing

adhesion to the Roman Church, at Bologna, 1712, though the fact was not publicly known in Saxony till five years later. It is possible that an eye to the crown of Poland, and to an alliance with one of the Austrian princesses, may have had something to do with this step. After succeeding his father in the electorate, 1733, he was chosen king of Poland by a part of the nobility, and triumphing over the rival claims of Stanislaus Leszcynski, supported by Louis XV., was unanimously proclaimed three years later. He inherited his father's sumptuous tastes, though not his talents; and his love of art, cultivated by his Italian tour, enriched the gallery of Dresden with noble paintings. The government of his country he made over entirely to his prime minister, Count von Bruhl, whose whole political system consisted in complete dependence upon Russia. In 1742, alarmed at the increased power Prussia had obtained by the conquest of Silesia, A. formed an alliance with Maria Theresa; and by the secret treaty of Leipsic, contracted to supply her with 50,000 men. But their united troops were completely routed by the Prussians, 1745; Frederick II. pushed on into Saxony, and A. fled from his capital, saving his art-treasures, but leaving his state-papers in the hands of the conqueror. In 1746, the peace of Dresden restored him Saxony; but the close of the year again saw him embroiled with Prussia. Joining the camp at Pirna, he narrowly escaped being taken prisoner, and fled to Poland, where his popularity, never very great, was much diminished by his recent reverses in Saxony, added to which the Empress Catherine of Russia used every effort to dislodge him, as being as ally of France. At the conclusion of the peace of Hubertsburg, A. returned to Dresden, where he died. His son, Frederick Christian, succeeded him in the electorate, and Stanislaus Poniatowski became king of Poland.

AUK, *awk* [Dan. *alke*], (*Alca*): genus of web-footed birds, type of a family called *Alcidæ*, which was in great part included in the Linnæan genus *Alca*, and to many of the species of which, now ranked in other genera, the name A. is still popularly extended. The *Alcidæ* are remarkable for the shortness of their wings, which they employ as fins or paddles for swimming under water, some being even incapable of flying; and for the position of their legs, further backward than in other birds, which makes walking difficult, and compels them, when on land, to maintain an upright attitude. They are distinguished by the very compressed bill, which, in the true auks, is vertically elevated, and so sharp along the ridge as to resemble the blade of a knife; and by their entirely palmated feet, destitute of hind toes. The auks are confined to the seas of the n. hemisphere—the penguins taking their place in the s. All of them have a dense plumage, generally with a beautifully polished appearance and silvery lustre.

The Great Auk (*Alca impennis*), so far as is known, is now extinct. It was about three ft. in height, an inhabitant of the temperate region of the n. Atlantic. At one

time large numbers bred on St. Kilda, and in prehistoric times it appears to have bred on Oronsay or neighboring skerries, and possibly frequented other islands of the Hebrides. It was occasionally seen at Orkney and Shetland, and probably bred at Papa Westra until 1812. It was rare along the shores of Norway and Sweden, but in prehistoric times frequented the fjords of Denmark, as its remains have been repeatedly found in the Danish kjökkenmöddings. There is only one breeding-place in Greenland on record, and that is Gunnbjorneskjoerne, supposed the same as Danell's or Graah's Islands. It bred on several skerries off the coast of Iceland, and the last Great Auks are supposed to have been killed on one of these named Eldey in 1844. In the North American habitat it bred in great numbers on Funk and other islands off the coast of Newfoundland, on some islands in the Bay of St. Lawrence, at Cope Breton, and probably at Cape Cod. Its remains have been found in shell-heaps at several places on the coast of Maine and Massachusetts. The Great Auk was invaluable as food, and but for the abundant fresh supplies afforded by its carcasses to the early voyagers, the fisheries at the Banks of Newfoundland would hardly have been developed as they were. The birds were so stupid, they sat still until they were knocked over by the seamen's short clubs, or allowed themselves to be driven on board the vessels in hundreds across sails or planks stretched from the gunwales to the shore. The rapidity with which this bird moved under water was extraordinary; one of them having been pursued by a six-oared boat for hours in vain. Like most of the *Alcidæ*, the Great Auk each year laid only one egg, about 5 inches in length, and 3 in maximum breadth. It laid it on the bare rock, without any attempt at a nest.—The Razor-bill (q.v.) (A. *torda*) is the only other species now commonly included in the genus *Alca*. The name Little Auk is often given to a bird called also the Rotche (q. v.) (*Mergulus alle*, formerly *Alca alle*), common in Arctic regions.—The common puffin is sometimes called the Labrador Auk.—The n. parts of the Pacific Ocean abound in auks remarkable for a somewhat quadrangular bill, notched near the tip, and which form the genus *Phaleris*. One of them, *P. psittacula*, is known as the Parrakeet Auk.—All the auks feed upon fishes, crustaceans, and other marine animals, which they pursue under water, and for which they dive to great depths.

AULARIAN, n. *aw-lā′rĭ-ăn* [L. *aula*, a hall]: at Oxford, the member of a hall, as distinguished from a collegian.

AULAX, n. *aw′lăks* [Gr. *aulax*, a furrow, in allusion to the furrows on the under side of the leaves in one species]: genus of plants belonging to order *Proteaceæ*, or *Proteads*. The species are pretty shrubs, with narrow leaves.

AULD LANG-SYNE, n. *awld′lăng-sīn′* [Scot, *auld*, old; *langsyne*, time long past—from *lang*, long, and *syne*, then, time past, since]: days that are long past; long, long ago.

AULETIC, a *aw'lĕt'ĭk* [Gr. *auletikos*, suitable for a pipe or flute—from *aulos*, a flute or other wind instrument]: pertaining to the pipe or flute.

AULIC, a. *aw'lĭk* [L. *aulĭcus;* Gr. *aulĭkos*—from Gr. *aulē*, a royal palace]: of or pertaining to a royal court.

Aulic Council: one of the two highest courts of the old German empire, co-ordinate with the Imperial Chamber. It came into existence 1495, and seems to have been at first employed principally in preparing business matters regarding the crown lands and the empire generally, in order to expedite the decisions of the Imperial Chamber. It soon began to assume or acquire higher functions. After 1502, the states submitted important grievances to its independent consideration; but it did not receive a fixed constitution before 1559. In 1654, it was formally recognized as the second of the two supreme courts, and equal in dignity to the Imperial Chamber. It was composed of a pres., a vice-pres., a vice-chancellor, and eighteen councilors all chosen and paid by the emperor, with the exception of the vice-chancellor, who was appointed by the Elector of Mainz. Of the eighteen councilors, six were Protestants, whose votes, when they were unanimous, could not be set aside by those of the others, so that a religious parity was to some extent preserved. The councilors were divided into three classes—counts, barons, and men of learning—all of whom were on a footing of equality, except that the last mentioned received a higher salary, and were usually advanced into the ranks of the nobility. The council held aloof from politics, but under its jurisdiction were placed: 1st, all matters of feudality in which the emperor was immediately concerned; 2d, all questions of appeal on the part of the states from decisions in favor of the emperor in minor courts; 3d, whatever concerned the imperial jurisdiction in Italy. On the death of the emperor, the council was dissolved, and had to be reconstructed by his successor. It finally ceased to exist on the extinction of the old German empire, 1806.

AULOPUS, n. *awl'op-ŭs* [Gr. *aulos*, a flute; *pous*, foot]: genus of fishes belonging to family *Salmonidæ*.

AULOSTOMA, n. *aw-lŏs'tom-a*, or Aulos'tomus, n. [Gr. *aulos*, a flute; *stoma*, mouth—*lit.*, flute-mouthed]: genus of spiny-finned fishes, of family *Fistularidæ*. Like the rest of the family, the snout ends in a tube. The only known species is from the Indian Ocean.

AUMALE, *ō-mâl*, Charles de Lorraine, Duc d': 1554–1631; an ardent partisan of the League in the politico-religious wars which devastated France in the latter half of the 16th c. The aim of the League was ostensibly to suppress the Huguenots, but in reality to secure the supreme power to the Guises. Closely allied by blood to this crafty and ambitious family, A. from the very first entered with fanatical sympathy into its schemes; and after the murder of the Duke of Guise at Blois in December, 1588, he became, with the Duke of Mayenne, the leader of the party.

In 1589, he seized Paris, dissolved the parliament, and imprisoned its members. Shortly afterward he put himself at the head of a body of troops to attack the town of Senlis, but was defeated by La Noue, and compelled to retreat. Always unfortunate in war, his presence seemed to insure the overthrow of his friends. He commanded a portion of the forces of the League at the battles of Arques and Ivri, where the Huguenots triumphed under their skilful and sagacious monarch, Henry IV. But A. was as obstinate as he was unlucky, and in the end proved himself as traitorous as he was obstinate. He held out for the League in Amiens until the populace expelled him, when he suddenly allied himself with the Spaniards who had invaded Picardy, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel. His property was confiscated, but he himself escaped, and lived in exile till his death.

AUMALE, Henri-Eugène-Philippe, Louis d'Orleans, Duc d': b. Paris, 1822, Jan. 16; d. 1897, fourth son of the late king of France, Louis Philippe. He enjoyed the privilege—rare among princes—of being educated with his fellowmen, at the college of Henri IV. When 16 years of age, he entered the army, soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. In 1843, in Algeria, he commanded a subdivision of the French army, and performed some brilliant exploits, the most signal of which was his surprising Abd-el-Kader, when encamped in the environs of Goudjilab, 1843, May 16, capturing a multitude of cattle, 4 standards, 3,600 prisoners, and the correspondence and treasure of the emir. He was, in consequence, elevated to the rank of lieut. gen., and appointed to the government of the prov. of Constantine. In 1847, he succeeded Marshal Bugeaud as gov.-gen. of Algeria. While holding this high office, he was exposed to a series of bitter attacks by the democratic 'opposition' in the chamber of deputies, but was ably defended by Guizot. After the expulsion of his father, he withdrew from Algeria, having first, with self-denying patriotism, exhorted the colony peaceably to obey the orders of the metropolis. He resided in England till 1871, when he returned to France, and was elected a member of the assembly. He was elected a general of division, 1872, and presided over the council of war which tried Marshal Bazaine. He was elected a member of the Academy 1871, expelled from France 1886, July 13, and authorized to return 1889, Mar. 9. He notified the French people 1886, Aug. 29, of his intention to bequeath to the Institute of France his domain of Chantilly, with all its vast treasures of war, art, literature, and history, the whole estimated to be worth $5,0000,000.

AUMBRY, n. *awm'brĭ*, or Aumry, n. *awm'rĭ* [other spellings of Ambry, which see]: in a church or cathedral, a closet in the side of the wall by the altar, in which the sacred vessels were kept.

AUNT, n. *ânt* [F. *tante:* OF. *ante,* an aunt—from **L.** *amĭta,* an aunt]: the sister of one's father or mother.

AURA, n. *aw'ra* [L. and Gr. *aura*—from Gr. *āō,* I blow or breathe]: a very gentle breeze; a breath; a subtle invisible vapor supposed to prbceed from a body; in *med.,* a peculiar subjective feeling as of a current of air rising to the head, or again of tingling or dizziness or fear or choking (in some cases a complete hallucination) which precedes or ushers in an epileptic or hysterical attack. The same aura is likely to herald each successive attack. The term was also used by the believers in a mesmeric fluid or similar force to refer to the carrying medium of such alleged influence.

AURIC, a. *aw'rĭk,* pertaining to the aura.

AURANTIACEÆ, *aw-răn'tĭ-ā'sē-ē* [from *aurantium,* mod. Lat. for an orange]: a nat. ord. of exogenous plants, shrubs, and trees, now appended to the order *Rutaceæ.* Both leaves and bark are generally very smooth, and all parts are filled with little transparent receptacles of a fragrant volatile oil, which sepecially abounds in the leaves and in the rind of the fruit. The leaves are alternate, and always articulated with their stalks, which are frequently winged. The flowers have a short, 3–5 toothed, withering calyx, and 3–5 petals, which are broad at the base, sometimes slightly coherent, and imbricated in bud. The stamens are equal in number to the petals, or a multiple of their number; the filaments sometimes slightly coherent in one or more bundles; the anthers terminal and erect. The stamens and petals are inserted on a disk. The ovary is free; there is one style with a thickish stigma. The fruit (a *hesperidium*) is pulpy, with a leathery or spongy rind, of one cell, or of a number of separable cells; the seeds attached to the axis, with thick cotyledons and no albumen, not unfrequently containing more embryos than one.—The order contains abt. 100 known species, natives of warm climates, and almost all of the East Indies. The species of the genus Citrus (q.v.) are the best known, among which are the orange, lemon, citron, etc. But the order contains many other plants producing agreeable fruits, among which the *Ægle Marmelos* (see ÆGLE)—called Bhel, or Bael, in India—*Cookia punctata* (the Wampee), *Glycosmis citrifolia,* and *Triphasia trifoliata* deserve particular notice. The fruits, ripe and unripe, juice and rind, the flowers, leaves, bark, etc., of a number of species are employed medicinally. The leaves of *Bergera Kœnigii* are used by the Hindus as a stomachic and tonic, the bark and roots as stimulants.—*Feronia elephantum,* a large tree growing in most parts of India, yields a gum which closely resembles gum-arabic, and is used for similar purposes. The young leaves of this tree have a smell like that of anise, and are used by the native practitioners of India as a stomachic and carminative.—*Skimmia* (or *Limonia*) *Laureola* and *Skimmia Japonica* are remarkable exceptions in this order, as to the climate to which they are adapted: the former grows on the cold and lofty mountains of the n. of India,

braving frost and snow; the latter, a beautiful shrub, recently introduced into Britain from Japan, is perfectly hardy even in the severest winters; its evergreen leaves and pretty little red berries remaining uninjured by frost.

AURATE, n. *aw′rāt* [L. *aurum*, gold]: a salt of auric acid. AURA′TED, a. of or like gold. AURIC, a. *aw′rĭk*, of or from gold; resembling gold; pertaining to gold; in *chem.* applied to those gold compounds in which that element has its higher valency, e.g., auric sulphide, auric oxide. AUROUS, n. *aw′rŭs*, full of gold; (more loosely) containing more or less of gold; in *chem.*, with gold univalent in its composition.

AUREATE, a. *aw′rĕ-āt* [mid L. *aurĕātus*, golden—from *aurātus*, gilded—from L. *aurum*, gold]: in *OE.*, golden. AUREOLIN, n. *aw-rē′ō-lĭn*, name in trade for the pigment cobalt-yellow. AUREOUS, a. *aw′rē-ŭs*, of golden-yellow color.

AURELIA, n. *aw-rē′lĭ-a* [L. *aurum*, gold: *au′rĕŏlus*, golden]: the chrysalis of an insect, more especially of a butterfly. See CHRYSALIS. AURE′LIAN, a. *-ĭ-ăn*, pertaining to the aurelia: N. an amateur collection of insects. AUREOLA, a. *aw-rē′ŏ-lă*, golden, as applied to a crown or golden nimbus: N. a circle of rays round the head of a portrait, to indicate something more than human—popularly called a glory.

AURELIANUS, *aw-rē-lĭ-ā′nŭs*, LUCIUS DOMITIUS—also named CLAUDIUS DOMITIUS and VALERIUS—one of the most powerful of the Roman emperors: 212–276; of humble origin, his father having been a husbandman. Enlisting early as a common soldier, he rapidly distinguished himself, and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270), A. was elected emperor by the army. He commenced his reign by vigorous attack on the barbarian Alemanni, or Marcomanni, whom he expelled. Thereafter, he began a new line of fortified walls round Rome, not completed till the reign of Probus (276). Their ruins still mark the boundaries of Rome in the time of Aurelian. Finding that the province of Dacia (now Wallachia) could not be maintained against the assaults of the Goths, he surrendered it, on certain conditions, and strengthened the frontier of the Roman empire by making the Danube its boundary. He next turned his attention to the East, where the renowned queen Zenobia (q.v.) had extended her sway from Syria to Asia Minor and Egypt. A. defeated her in two battles, and besieged her in Palmyra, from which she attempted to escape, when she saw defense would prove unavailing. She was taken prisoner, and soon the city surrendered, and was treated leniently Shortly after A. had departed, a new insurrection took place. He returned, in 273, and gave the splendid city up to destruction. A. was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of great influence, which he speedily quelled. Besides, Tetricus, who had held imperial power in Gaul since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelian. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, A. merited the title awarded to him by the

senate—'Restorer of the Roman Empire.' He fell a victim to conspiracy during his campaign against the Persians.

AURE'LIUS, MARCUS: see ANTONINUS.

AURELLE DE PALADINES, *ō-rĕl' dĕh pâ-lâ-dēn*, LOUIS JEAN BAPTISTE D': soldier: 1804, Jan. 9—1877, Dec. 17; b. Mabzieu, Lozère, France. Educated at St. Cyr milit. school, he entered the army 1824; served with distinction in Africa 1841–48; brig.gen. 1851. He earned high distinction at the Alma and at Inkermann in the Crimean war. He was promoted gen. of div. 1855; retired 1870, but on the outbreak of the war with Germany, was given command of the army of the Loire, which he thoroughly organized. 1870, Nov. 9, he defeated the Bavarian gen. Von der Tann at Coulmiers; but in Dec. suffered severe loss in a conflict with the army of Prince Friedrich Karl, of Prussia, and was removed from his command. He was chosen life senator 1876. He wrote: *Campagne de* 1870–1; and *La Première Armée de la Loire.*

AUREOLA, n. *aw-rē'o-la* [from L.L. adj. *aureolus*, dim. of L. *aureus*, golden]: in *Christian art*, a gold-colored or gilded background, representing an emanation of rays of glory, given to figures or symbols of the three persons of the divine trinity, of Jesus Christ, of the Madonna and Child, or of the Virgin alone, particularly when she is portrayed in her assumption into heaven. In form the A. is usually oval, and hence it is sometimes called *scutum* (shield) and *vesica piscis* (fish-bladder). The A. differs from the Nimbus (q.v.) in that the nimbus represents rays of glory emanating from and surrounding only the head of the subject, while A. is very commonly employed in both senses. In German, too, the words *Heiligenschein* (radiance of holiness) and *Glorie* are used indifferently to signify A. and nimbus. In the language of mediæval theol. the A. is a certain special enhancement of the essential glory of the elect in heaven, and is awarded to certain orders of the blest. Thomas Aquinas gives it to virgins, martyrs, doctors, and preachers: to virgins because of their triumph over the flesh, to martyrs for their triumph over the world; to doctors and preachers for their triumph over the devil.

AUREOLE, n. *aw'rē-ōl* [L.L. *aureola*]: an aureola (q.v.); a nimbus; a halo real or figurative.

AUREUS, n. *aw'rĕ-ŭs* [L., of gold]: anc. Roman gold coin first minted B.C. 207, with the same die as the denarius (q.v.), hence called *denarius aureus* (gold denar). The first aurei issued were of very fine gold, weighing $\frac{1}{40}$ lb., and each was equivalent to 25 silver denarii or 100 sesterces (q.v.). Under the commonwealth the A. was very seldom coined; under the emperors it was issued frequently, but its weight was steadily diminished: under Marcus Aurelius it weighed $\frac{1}{42}$ lb.; and under Caracalla $\frac{1}{50}$ lb. In Constantine's reign and afterward it was called solidus (q.v.).

AU REVOIR, *ō rė-vwŏr'* [F.]: till we meet again; good-bye.

AURI-ARGENTIFEROUS, a. *aw'rī-ăr-jĕnt-ĭf'ĕr-ŭs* [L. *aurum*, gold; *argentum*, silver; *fero*, bear, carry]: bearing or containing gold and silver.

AURIC, *aw′rĭk*, Acid: Trioxid of gold, Au_2O_3, does not combine with acids to form salts, but a hydrated form of the oxid, $Au_2O_3.H_2O$, is known, which unites with bases to form salts. From this acid-like property, the hydrated oxid has been called 'auric acid.' Compounds of auric acid with bases are called 'aurates.' Aurate of potassium, $Au_2O_3.K_2O.3H_2O$, is a crystalline substance, readily dissolving in water with the formation of an alkaline solution. When digested with ammonium sulphate, it yields an aurate of ammonia of undetermined composition, called 'fulminating gold.' This substance, yellowish-brown in color when in the solid form, decomposes explosively upon percussion, or when heated to 212° F.

AURICHALCITE, n. *aw-rĭ-kăl′sīt* [L. *aurichalcum* or *orichalcum*—from Gr. *oreichalkos*, yellow copper ore—from *oros*, a mountain, *chalkos*, copper, bronze, brass]: a mineral occurring in acicular crystals, forming drusy incrustations; also columnar, plumose, granular, or laminated. Its lustre is pearly; its color pale green, or sometimes azure. The hardness is 2. A. is a basic carbonate of zinc and copper, formerly called brass ore because containing zinc and copper, though not brassy in appearance. The composition: oxide of copper, 16.03 to 32.5; oxide of zinc, 32.02 to 56.82; carbonic acid, 14.08 to 24.69; water, 9.93 to 10.80; lime, 0. to 8.62. It is found in England, Scotland, Spain, Asia, and America. Buratite, by some called *lime aurichalcite*, occurs in France and Austro-Hungary.

AURICLE, n. *aw′rĭ-kl* [L. *auric′ula*, the ear-flap—from *auris*, an ear: F. *auricule*]: the outside ear; that cavity in the heart which receives the blood from the system or breathing organs, and pumps it into the ventricle—in the human heart the auricles being somewhat ear-shaped. See Heart. Auricled, a. *aw′rĭ-kld*, having ear-shaped lateral appendages. Auricular, a. *aw′rĭk′ū-lėr*, pertaining to the ear; told to the ear; secret. Auric′ularly, ad. *-lĭ*. Auric′ular confession, confession of sins made in the ear of the priest in the confessional with a view to absolution. Auric′ulate, a. *-lāt*, or Auric′ulated, a. shaped like the ear. Auriform, a. *aw′rĭ′fawrm* [L. *forma*, a shape]: in the shape of an ear. Au′rist, n. one who treats diseases of the ear. Auriscope, n. *aw′rĭ-skōp* [Gr. *skopĕō*, I see or view]: an instrument which covers the auricle in order to ascertain by it the condition of the internal ear and its passage. Auriculo-ventricular-orifice, n. the orifice through which the blood passes from the auricle into the ventricle. It is guarded on either side by valves. Auricula, n. *aw-rĭk′ū-lă*, a species of primrose called *bear's ear*, a native of Swiss Alps, ord. *Primulācĕæ*.

AURICULA, *aw-rĭk′ū-la* (*Primula Auricula*): a plant of the same genus with the Primrose (q. v.), much cultivated in flower-gardens. It was highly esteemed by the Romans, and has, for nearly 200 years, received particular attention from the florists of England and Holland. Its cultivation is very successful in the little gardens of opera-

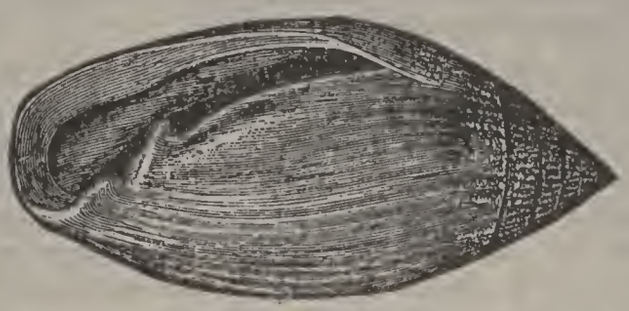
tives near large towns. The A. has smooth, dark green leaves, scapes (or leafless stems), and calyxes, covered with a mealy powder. A similar fine meal appears also on the flowers, and adds much to their beauty. The A. is a native of the Alps and other mountains of the middle and s. of Europe, and of subalpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria; it grows in shady and moist places. In a wild state, it has comparatively small flowers, of a simple yellow color, on short stalks, forming an umbel of generally six or seven on one scape, with the same delightful fragrance which it has in cultivation. The leaves are used by the inhabitants of the Alps as a remedy for coughs.

By cultivation and art, the A. has been brought to great splendor of color. Red, pink, crimson, apple-green, and mulberry are the chief colors of the different varieties More than 1,200 varieties have been reckoned, and new ones are continually appearing, some entirely of one color others of two or more; some delicately shaded, some variegated. The mere color of an A. is not of so much consequence, in the eye of a florist, as the form and shading. The chief requisites of a good A. are large flowers, so many of them on one scape as to give fulness to the umbel, the flower-stalks so strong that the flowers do not hang down; the scape itself must be so tall that the umbel of flowers may rise completely above the leaves, and so strong as to bear it erect; the flower must be nearly round; the white or yellow eye in its centre must be distinct and round, its color not mixing with the ground color, which, however, may mix at the outer part with the green of the margin. The green margin adds much to the beauty of many varieties. The mealiness of the flower differs much in different varieties.—The A. blooms in April and May, and often a second time in the end of autumn. It thrives in a rich light soil, and cultivators diligently prepare for it composts of various kinds, in general chiefly of fresh loamy soil, and of well-rotted horse or cow dung, often with a little sand. The finer varieties are always cultivated in pots, and require great attention. They are protected from the severe weather of winter, and during the flowering season from wind and rain. They ought, however, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August.—When it is proposed to raise the A. from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air, hand-glasses being placed over them during heavy rains. The seed is sown either in autumn or spring, generally in boxes placed under shelter, or in a slight hot-bed. The more weakly plants are tended with particular care, as they are generally found to produce the finest flowers.

The name A., originally Latin, is derived from *auris*, an ear, on account of a fancied resemblance of the leaves to the ears of an animal.

AURIC'ULA: a genus—and AURICU'LIDÆ: a family

—of Gastropod Mollusca. They have a spiral shell, covered with a horny epidermis, the first whirl very large and the spire short, the aperture elongated and toothed. They belong to that section of Gastropods in which the sexes are united in the individual, and to the same order



Auricula.

with the common snails, having respiratory organs adapted for breathing in air, though some of them are capable of subsisting for a considerable time in water. Some of them inhabit fresh-water marshes, others prefer the vicinity of salt water. They generally belong to warm climates, and some of them attain a large size. *Auricula Midæ*, a native of the East Indies, is known to shell-collectors by the name of Midas's Ear.

AURIC'ULAR CONFESSION: see CONFESSION.

AURIC'ULATE, in Botany: a term applied to leaves, stipules, etc.; signifying that they have at the base two small ear-like lobes.

AURIFEROUS, a. *aw-rĭf'ėr-ŭs* [L. *aurum*, gold; *fĕro*, I produce]: yielding or producing gold.

AURIGA, n. *aw-rī'ga* [Sp. and L. *auriga*, a wagoner—from *aurea*, a bridle; *ago*, I drive, I manage]: one of the ancient northern constellations, the Wagoner; in *anat.*, the fourth lobe of the liver; in *surgery*, a bandage for the sides.

AURIGRAPHY, n. *aw-rĭg'ra-fĭ* [L. *aurum*, gold; Gr. *grapho*, I write]: the act or process of writing with gold instead of ink.

AURILLAC, *ō-rē-yâk'*: t. of France, cap. of the dept. of Cantal (Auvergne); in a pleasant valley on the banks of the Jourdanne, about 269 m. s. from Paris. It is said to owe its origin to a Benedictine monastery founded in the 9th c. by St. Gerard. The English, in the 14th and 15th centuries, often besieged the town, and it was frequently taken and pillaged during the religious wars in France in the 16th c. The streets are wide but irregular, and are kept clean by streams supplied by a reservoir above the town and by a canal from the Jourdanne. The neighboring quarries supply slates to cover the houses. The principal buildings of A. are the churches of Notre Dame and St. Gerard, St. Stephen's Castle, the theatre, college buildings, which contain a valuable public library, and the corn-market. Paper, jewelry, lace, copper utensils, leather, and beer are the chief industrial products. Pop. 14,000.

AURORA, n. *aw-rō'ră* [L. *Aurōra*, the goddess of the morning]: the rising light of the morning; the plant crowfoot. AURO'RAL, a. belonging to the morning. AURO'RA BOREALIS, n. *bŏr ē-ā'lĭs*, shooting lights of varied colors seen in the northern parts of the heavens, generally called the northern lights. AURORA AUSTRALIS, n. *-aws-trā'lĭs*, the southern lights.

AURORA, city in Kane co., Ill.; on Fox river and the Chicago, Burlington and Quincy, the Chicago and Northwestern and other railroads; about 38 m. w. of Chicago. The industries include foundry and machine shops, smelting works, cotton mills, carriage and wagon works, wheel-scraper factory, etc., and the extensive shops of the C. B. & Q. railroad. A. is the seat of the Aurora Business College and the Jennings Seminary for young women, and also contains public and high schools, a Carnegie Library, many churches, banks, and other public buildings. A. was first settled in 1834, became a village in 1857, and was incorporated as a city 1887, the govt. being vested in a mayor and council of 14 members, one half elected each year for two years. The city owns and operates the waterworks and electric light plant. Pop. (1910) 29,807.

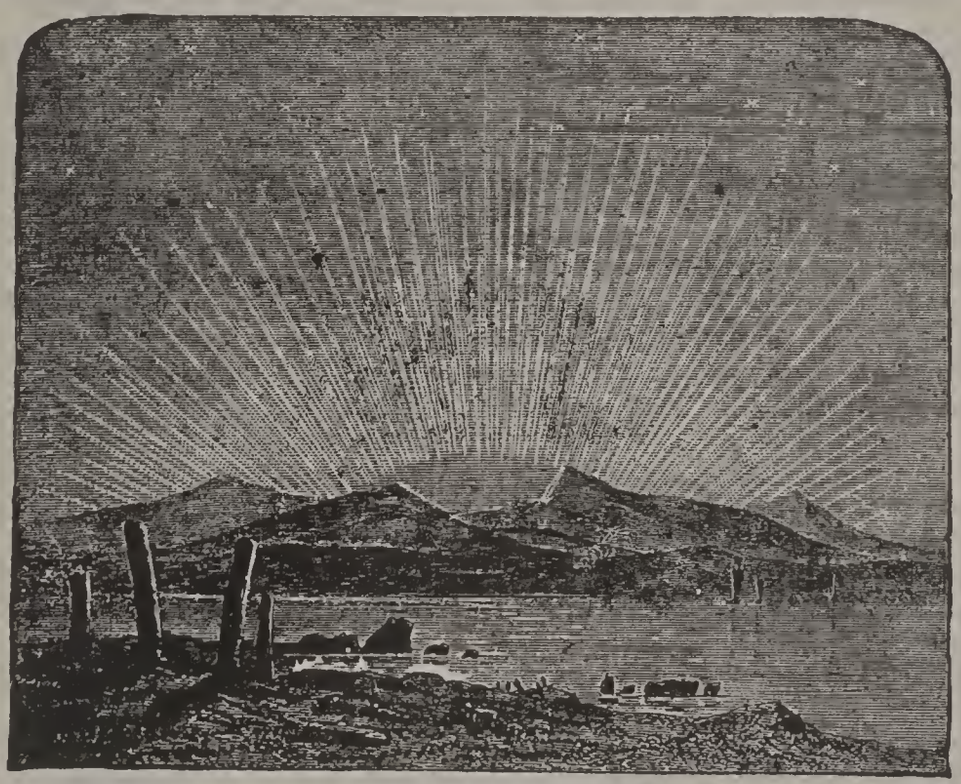
AURORA, town in Dearborn co., Ind.; on the Ohio river, and on the Cleveland, Cincinnati, Chicago and St. Louis and the Ohio and Mississippi railroads; about 25 m. below Cincinnati. The city has a large hay and grain trade and contains extensive car shops, bank, schools and churches. Pop. (1910) 4,410.

AURORA: city in Lawrence co., Mo.; on the St. Louis and San Francisco railroad at the junction of a branch line extending to Mt. Vernon and Greenfield; about 18 m. n.w. of Pierce City. The chief industries are lead and zinc mining, farming and fruit growing; there are also foundries and machine shops, flour mills, etc. The city contains numerous churches, two banks (cap. $75,000), ward and high schools, and is governed by a mayor and council of 6 members elected for two years. A. became a borough 1872 and was incorporated as a city 1887. Pop. (1910) 4,148.

AURO'RA (styled *Ēōs* by the Greeks): the goddess of the dawn, or 'morning redness;' dau. of Hyperion and Theia, sister of Helios and Selene, wife of the Titan Astræus. Zephyrus, Boreas, Notus, Hesperus, and the other stars were her children. She was described as rising in the morning from her bed in the ocean, borne along on a chariot drawn by the divine steeds Lampus and Phaëton, ascending heaven from the river Oceanus, where she lifted with her 'rosy fingers' the curtain of night, and announced the light both to gods and men. Homer frequently describes A. as the goddess of day, and the tragic writers identified A. with *Hemera* (the day). She was presented as clothed in a rosy-yellow robe, with a star

shining on her forehead, and a torch in her right hand. She had a passion for mortal youths, and carried off Orion, Cleitus, and Tithonus.

AURORA BOREALIS, *aw-rō'ra bŏr'ē-ā'lĭs*, or NORTHERN LIGHTS (Ger. *Nordlicht*): the luminous phenomenon seen towards the north of the heavens by the inhabitants of the higher latitudes. During the winter of the n. hemisphere, the inhabitants of the arctic zone are without the light of the sun for months together, and their long dreary night is relieved by the light of this beautiful meteor, frequent in those regions. Those who have explored the southern seas have seen the same phenomenon in the direction of the south pole, so that the term Polar Lights might be more appropriate than Northern Lights to designate the aurora. The appearance of the Aurora Borealis has been described by a great variety of observers, both in northern and central Europe, all substantially to the same effect. A dingy aspect of the sky in the direction of the north is generally the precursor of the Aurora Borealis;



Aurora Borealis.

this gradually becomes darker in color, and assumes the form of a circular segment surrounded by a luminous arch, and resting at each end on the horizon. This *dark segment*, as it is called, has the appearance of a thick cloud, and is frequently seen as such in the fading twilight before the development of the auroral light. Its density must, however, be very small, as stars are sometimes seen shining brightly through it. This dark segment is bounded by a luminous *arch* of a bluish-white color, which varies in breadth from 1 to 6 diameters of the moon, having the lower edge sharply defined, and the upper edge only when the breadth of the arch is small. This arch may be con-

sidered to be a part of a luminous ring elevated at a considerable distance above the earth's surface, and having its centre corresponding with some point near the n. pole. An observer several degrees s. of this auroral ring would see towards the n. only a small arc of it, the larger part being hid by the earth; to one situated not so far s. it would appear as a larger and higher arch; to one placed below it, it would be seen as an arch passing through the zenith; and to one within the ring and further n. it would be found as an arch culminating in the s. On this supposition, nearly all the various positions of the auroral arch may be accounted for. The centre of the ring corresponds probably with the magnetic north, which is at present situated in the island of Boothia Felix. Hence it is that in Greenland, to the east of this island, the auroral arch has been seen stretching from n. to s. with its highest point in the w. The luminous arch, once formed, remains visible for several hours, and is in a constant state of motion. It rises and falls, extends towards the e. and towards the w., and breaks sometimes in one part, sometimes in another. These motions become all the more observable when the arch is about to shoot forth *rays;* then it becomes luminous at one point, eats in upon the dark segment, and a ray of similar brightness to the arch mounts with the rapidity of lightning towards the zenith. The ray seldom keeps the same form for any length of time; but undergoes continual changes, moving e. and w., and fluttering like a ribbon agitated by the wind. After some time, it gradually fades in brightness, and at last gives way to other rays. When the aurora attains its full brightness and activity, rays are projected from every part of the arch, and if they do not rise too high, it presents the appearance of a comb furnished with teeth. When the rays are very bright, they sometimes assume a green, sometimes a violet, a purple, or a rose color, giving to the whole a variegated and brilliant effect. The accompanying sketch, taken from Müller's *Kosmische Physik*, of the Aurora Borealis in Norway, represents a beautiful aurora of this comb-shaped character. When the rays darted by the luminous arch are numerous and of great length, they culminate in a point which is situated in the prolongation of the dipping-needle, somewhat s.e. of the zenith. There they form what is called the *Boreal Crown;* and the whole heavens, towards the e., w., and n., present the appearance of a vast cupola of fire, supported by columns of variously colored light. When the rays are darted less brilliantly, the crown first disappears, then, here and there, the light becomes faint and intermittent, till at last the whole phenomenon fades from the sky.

The preceding description indicates the general features of the appearance of the Aurora Borealis; but several auroras have been described which presented striking peculiarities. Sometimes the phenomenon assumed the form of one or more curtains of light, depending from dingy clouds, whose folds were agitated to and fro, as if by the wind. Sometimes this curtain seemed to consist of

separate ribbons of light, arranged side by side in groups of different lengths, and attaining their greatest brilliancy at the lower edges.

The height of the aurora has been variously estimated. The first observers were inclined to place the seat of it beyond the atmosphere; but this hypothesis is untenable, as the aurora does not seem to be affected by the rotation of the earth, but appears to be in every respect a terrestrial phenomenon. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, heights varying from 5 to 500 m. have been calculated. The cause of these widely differing results may be found in the probability that exists of each observer seeing a different arch of the aurora for himself, and he is, in consequence, furnished with no comparable or reliable data for his calculations. It is now, however, generally admitted, on what are considered sufficient grounds, that the Aurora Borealis occurs at various heights, and that it is seldom found beyond 90 m. above the surface of the earth. The distance of the stations at which the same aurora has been visible indicates the enormous geographical extent, and likewise the great altitude, which the phenomenon frequently attains. One aurora, for instance—that which occurred 1839, Sept. 3, was seen in the Isle of Skye by M. de Saussure; at Paris, by the astronomers of the Observatory; at Asti, in northern Italy, by M. Quetelet; at New Haven, Conn., by Mr. Herrick; and at New Orleans by credible observers. On the other hand, some observers of eminence assert that the aurora sometimes descends to the region of the clouds, and appears almost as a local phenomenon. Boscovich estimated the height at 825 m.; other observers have named a few hundred feet. Dr. Sophus Tromholt, who carried out a series of investigations on the subject of the Aurora Borealis in the extreme n. of Norway, affirms (in his book *Under the Rays of the Aurora Borealis*, 1885) that the height of those observed by him ranged from 62 to 124 m. It seems to be entirely untrue that the light of the aurora is ever serviceable to people in their work; its contribution to lighten the darkness is almost nil; the momentary flashes of real luminosity are very brief and of no practical value.

The noise that is alleged to accompany the Aurora Borealis in high latitudes would indicate for it a comparatively moderate height. Some of those who have heard it compare it to the noise produced by the rolling of one piece of silk upon another; and others to the sound of the wind blowing against the flame of a candle. In Siberia, it has been related that this noise sometimes resembles that attending the discharge of fireworks; and that the dogs of the hunters, when overtaken by such an aurora, lay themselves with terror on the ground.*

The intimate connection between the Aurora Borealis

* Arctic voyagers, such as Parry and Franklin, throw doubt on the existence of any such noise, for not one of the numerous and brilliant auroras seen by them was ever attended with the faintest sound.

and the magnetism of the earth is shown by various facts. During the occurrence of the phenomenon the magnetic needle appears very much disturbed, sometimes deviating several degrees from its normal position, and appearing to be most affected when the aurora is brightest; and this oscillation is frequently perceived far beyond the district where the aurora is seen. The vertex, likewise, of the luminous arch is almost always found to be in or very near the magnetic meridian, and the boreal crown has its seat in the prolongation of the freely suspended needle. There seems, moreover, to be a connection between the magnetic poles of the earth in regard to the aurora, for, so far as has been ascertained, the meteor occurs simultaneously at both. The Aurora Borealis appears to be an electric discharge connected with magnetic disturbance. If one of Gassiot's vacuous tubes is brought near an electric machine, or between the poles of an induction coil, flashes of light pass between the ends, which bear a striking resemblance to the Aurora Borealis. A comparison of the spectra of the two goes far to establish identity. The auroral spectral line, according to Angström, is a yellow line near the sodium line, and is the same as the air line seen in the solar light when the sun is near the horizon. Other lines, however, have been seen, which cannot as yet be produced by the physicist from any known substance.

Astronomers have found that there is a relation between disturbances on the sun—sun-storms—and auroral displays on the earth—magnetic storms. During the presence of great sun spots auroras have been frequent. These solar storms seem to produce disturbances in the magnetism of the earth which result in auroral displays. The exact relation between sun spots and auroras has not yet been established; it is therefore unsafe at present to predict auroras from the condition of the sun's surface.

A line drawn through the s. of Spain to the n. of the Sandwich Islands, and through Cuba, approximately marks the s. limit of the Aurora Borealis (in the northern hemisphere); though occasional displays have been noticed further south. To the n. of a line passing through Edinburgh, the frequency of the Aurora Borealis rapidly increases, until a maximum is reached in a line through the n. of Spitzbergen, after which the frequency diminishes as the North Pole is approached.

AURUNGZEBE, *ō-rŭng-zāb′* (properly, Aurangzîb, 'Ornament of the Throne'): most powerful of the Great Moguls, the last who ruled with energy and effect: 1618, Oct. 22—1707, Feb. 21. He was ten years old, when his grandfather died, and his father, Shah-Jehan, ascended the throne. A. early aspired to wield the rod of empire, but he craftily hid his designs beneath the cloak of piety. In 1657, his father, who had previously promoted him to high civil and military offices in the state, in which A. distinguished himself, was seized with an illness from which he was not expected to recover. The reins of power

were at once seized by his eldest son, Dára, who treated his brothers very arbitrarily—Shujá at that time being governor of Bengal, A. of the Deccan, and Múrad of Guzerat. The first immediately took up arms. A.'s policy was to let the two fight it out, and exhaust each other, and then to play off his third brother against the victor. He conferred with Múrad; assured him he had no earthly ambition; that the crown he strove for was a spiritual, not a temporal one; and that, for affection's sake, and with a view to promote the interests of the true faith (Dára was liberal in his religious opinions, and had written a book to prove that Mohammed and Brahma agreed in all essential points) he would support his pretensions to the throne. Múrad believed him, and the forces of the two were joined. Meanwhile, Dára having overcome Shujá's army, directed his forces against his other two brothers; but A.'s plausibility prevailed over Dára's generals, who deserted, and Dára had to seek safety in flight. By this time, however, Shah-Jehan had somewhat recovered. A. professed the utmost loyalty, but secretly gave his son in-

Aurungzebe.—From a Native Drawing.

structions to take possession of Shah-Jehan's palace, which was done, and the aged monarch was made prisoner. A. next seized and confined his too confiding brother, Múrad; and after a struggle of two or three years' duration, Dára and Shujá also fell into his power, and all three were put to death. The sceptre was now firmly within the grasp of Aurungzebe. He professed not to care for the imperial insignia, but was ultimately induced to receive them, 1678, Aug. 2. He, at the same time, assumed the presumptuous title of Alemgír, 'Conqueror of the World.' He also took the title of Mohi-eddîn, 'the Reviver of Religion.' In the seventh year of A.'s reign, his father died, at a good old age; but there are suspicions, nevertheless, that his death was hastened by slow poison, administered by command of his son.

A.'s long reign of half a century was distinguished by great outward prosperity; but the empire was diseased at its heart. Everywhere there was distrust; A., who had established his empire by fraud, was naturally distrusted by all. He lacked confidence in his statesmen, who, in their turn, distrusted him and one another. His sons imitated him in his disobedience to his father, and the Hindus, whom he treated with great harshness, excited the Mahrattas against him in the south. Still his great abilities sufficed during his reign not only to preserve his empire, but even to enlarge it. Discord between the monarchs of Bíjapur and Golconda, due mainly to his policy when acting as governor of the Deccan, enabled him to add these two kingdoms to his empire. But the seeds of decay sown in his reign bore ample fruit in the reign of his son. The decadence of the Mogul empire dates from A.'s death, at Ahmednuggur, in the 89th year of his age, and 50th of his reign. The latter years of A.'s life were passed in misery. The memory of his own crimes weighed heavy on his soul. He lived in constant dread that he himself would receive of the measure which he had meted out to others. His court was remarkable among oriental courts for its economy and freedom from ostentation. A.'s character was not without its good features, as instanced by the fact that in the third year of his reign, when there was a great famine in the land, he gave unreservedly the funds of his treasury, which had been greatly augmented by his frugality, to procure food for his people.

AUSABLE, *aw-sâ'bl:* city of Iosco co., Mich., on the Detroit Bay City and Alpena railroad; 50 m. from Bay City. Principal industries: lumbering, salt-making, and fishing. There are two state banks, one with capital $25,000, the other $50,000, $3,500 surplus, and $8,500 undivided profits. Two weekly newspapers are published. Pop. 2,000.

AUSCULTATION, n. *aws'kŭl-tā'shŭn* [F. *auscultation*—from L. *auscultātiōnem*, a listening with attention—from L. *ausic'ula*, old form of *auric'ula*, dim. of *auris*, an ear]: mode of detecting diseases, especially of the heart and lungs, by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (*Immediate* A.) or by the aid of a simple sound-conveying instrument, the stethoscope (q.v.) (*Mediate* A.). By care and attention, the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. A. is among the most important discoveries in modern medical science (see PERCUSSION). AUSCULTATORY, a. *aws-kŭl'tă-tėr'ĭ*, pertaining to hearing. AUS'CULTA'TOR, n. one who listens.

AUSONIA, n. *aw-sō'nĭ-a* [L. *Ausonia*—from *Ausones*, the inhabitants of *Ausona*, a town in Latium]: an ancient name of Italy; in *astron.*, an asteriod, the 63d found. It was discovered by De Gasparis, 1861, Feb. 11.

AUSPICE, n. *aw'spĭs*, AUSPICES, n. plu. *aw'spĭs-ĕz* [L. *auspĭcem*, a diviner by birds: *auspĭcĭŭm*, augury from birds —from *avis*, a bird: *spĕcĕrĕ*, to inspect]: omens drawn from birds; influence; patronage and care; protection. See AUGURIES. AUSPICATORY, a. *aw'spĭ-ka-to-rĭ*, or AUSPICIAL, *aw-spĭsh'al*, a. pertaining to auspices. AUSPICIOUS, a. *aw-spĭsh'ŭs*, having omens of success; prosperous; lucky; fortunate; favorable. AUSPI'CIOUSLY, ad. *-lĭ*. AUSPICIOUSNESS, n. *aw'spĭsh'ŭs-nĕs*, the prospect of a favorable issue.

AUSTEN, *aws'tĕn*, JANE: English novelist: 1775, Dec. 16—1817, July 18; b. Steventon, Hampshire, of which her father was rector. Her education was superior to that usually given to young ladies in the end of last century, and in her girlhood she was distinguished by good sense, sweetness of disposition, and personal attractions. From her childhood she wrote stories, but the first published were *Sense and Sensibility* (1811); *Pride and Prejudice* (1813); *Mansfield Park* (1814); and *Emma* (1816). These novels are remarkable for the truthfulness with which they portray the every-day life of the middle classes of England in her time, and for their delicate yet withal distinct discrimination of the various shades and peculiarities of character. Within their limits they are perfect, and exercise a singularly subtle charm over the reader. Sir Walter Scott says in his diary: 'That young lady had a talent for describing the involvements, feelings, and characters of ordinary life which is to me the most wonderful I have ever met with. The big bow-wow I can do myself like any one going; but the exquisite touch, which renders commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me.' *Northanger Abbey* and *Persuasion* followed, with her name on the title-page, 1818, after her death, at Winchester. See her memoir by her nephew, J. E. Austen Leigh (2d ed. 1871), and a collection of her letters edited by Lord Brabourne (1884): also complete ed. of her novels (N. Y. 1892).

AUSTEN, PETER TOWNSEND, American chemist: b. Clifton, N. Y., 1852, Sept. 10. He was educated at Columbia University School of Mines, and in Germany and Switzerland. In 1876 he was appointed instructor of chemistry at Dartmouth; and was professor of chemistry at Rutger's College and the New Jersey Scientific School from 1877–87. From 1887 to 1893 he was engaged in industrial work, and 1893–8 was professor of chemistry at Brooklyn Polytechnic Institute. He has invented several useful manufacturing processes; has written a number of valuable papers, and translated Pinner's *Repetitorium der Organischen Chemie* under the title *An Introduction to the Study of Organic Chemistry*.

AUS'TEN, WILLIAM: English metal-worker and designer of the 15th c.; constructor of the famous tomb of Richard de Beauchamp, Earl of Warwick, in St. Mary's Church, Warwickshire.

AUSTERE, a. *aw-stēr'* [F. *austère*—from L. *austērus*, rough: Gr. *austēros*—from *auō*, I dry up, I parch: It. *austero*]: severe; harsh; stern; sour. AUSTERE'LY, ad. *-lĭ.* AUSTERE'NESS, n. roughness or harshness as in taste or conduct. AUSTERITY, n. *aws-tĕr'ĭ-tĭ*, strictness in manners or life; severity; rigor; harshness. AUSTER'-ITIES, n. plu. *-ĭ-tĭz.*—SYN. of 'austere': sour; rough; rigid; harsh; stern; rigorous; severe.

AUSTERLITZ, *aws'tér-lĭts:* small town in Moravia, about 12 m. e.s.e. of Brunn; on the Littawa. It is celebrated chiefly as the place where Napoleon I., 1805, Dec., defeated the combined forces of Austria and Russia, under the command of their respective emperors. After the occupation of Vienna by the French, Napoleon fixed his headquarters at Brunn, and on this place the allied armies advanced. Their movements were ill conducted. The French army amounted to about 70,000 men; while the allied armies numbered 95,000, of which 16,000 were cavalry. The battle began at seven on the morning of Dec. 2; and in this disastrous battle the allies lost 27,-000 in killed, wounded, and prisoners, and the French 6,800. Pop. of A., 3,500.

AUSTIN, *aws'tĭn:* city and county-seat of Mower co., Minn.; on the Red Cedar river and the Chicago Great Western, and the Chicago, Milwaukee, and St. Paul railroads; about 100 m. s. of St. Paul. It is in the centre of a fertile agricultural region which produces wheat, barley, flax, butter, live-stock, etc., and its manufactories include brick and tile works, meat-packing establishment, foundry, railroad shops, creamery, flour mills, cement works, etc. A. contains the Southern Minnesota Normal School, a Carnegie Library, county court-house, high and public schools, churches, banks and other fine public buildings. The city was first settled about 1852, was incorporated as a village in 1868 and as a city in 1873. Its government is vested in a mayor, elected annually, and a city council. The water-works and electric light plant are owned by the city. Pop. (1910) 6,960.

AUS'TIN: city and county-seat of Travis co., Texas, and capital of the state; on the north bank of the Colorado river and on the International and Great Northern, the Houston and Texas Central and the Austin and Northwestern railroads; 81 m. n. n. e. of San Antonio, 186 m. w. by n. of Houston and 230 m. n. w. of Galveston. The city is finely located, about 40 ft. above the river, which, in its lower course, is navigable for steamers, and is here spanned by two bridges. In 1892 a large dam for water power and water supply, 1,275 ft. long by 67 ft. above bed rock, was completed, but it proved a failure, being carried away by a flood 1900, April 7. While it was in existence it created a larger sheet of water known as Lake McDonald. A. has a large export trade in cotton and

grain, hides and wool, agricultural produce and live stock, and also an extensive wholesale trade in agricultural implements, provisions, drugs, dry goods, etc. There are manufactories of lumber and iron goods, tanned leather and flour, and oil refineries. The city is well-built, with wide and well shaded streets; on a gentle elevation in the centre is Capitol Square, which contains the State capitol, erected of Burnet granite at a cost of $3,000,000. The city also contains the State asylums for the insane, blind and deaf mutes, and also for the colored deaf, blind and insane; State Confederate Home; Tillotson Institute for Colored Pupils; St. Edward's College; the main buildings of the University of Texas; the State land office and the county court-house; several seminaries and academies, and a well graded public school system. There are numerous churches, banks, and daily, weekly and monthly periodicals. The city owns and operates the water-works and electric light plant. The city government, under a revised charter of 1901, is vested in a mayor, biennially elected; a city council, and municipal officials. Austin was originally called Waterloo, but in 1837, after the Texan revolution, was incorporated and named after Stephen F. Austin (q.v.); in 1839 was made the capital of the Republic of Texas, and when Texas was admitted to the Union became permanent capital. Pop. (1910) 29,860.

AUSTIN, Alfred: Eng. poet-laureate; b. Headlingly, near Leeds, 1835, May 30. In 1853 he took his degree at the Univ. of London, was called to the bar in 1857, and was editor of the *National Review* from 1883 to 1893. In 1896, Jan. 1, he was appointed poet-laureate of England to succeed Alfred Tennyson (q.v.). He has written *The Season: a Satire* (1862); *The Human Tragedy*, (1862); *The Golden Age: a Satire* (1871); *The Tower of Babel*, a drama (1874); *Savonarola*, a tragedy, (1881); *Fortunatus, the Pessimist* (1891); *The Garden That I Love* (1894); *Veronica's Garden* (1895); *In Lamia's Winter Quarters; Haunts of Ancient Peace* (1902); and *A Lesson in Harmony* (1904). He has also published *English Lyrics* (1890); *The Conversion of Winckelmann, and other Poems* (1897); a war poem *To Arms* (Dec. 1899), and one on the relief of Mafeking (May, 1900); *Songs of England* (1900); *A Tale of True Love and Other Poems* (1902), dedicated to President Roosevelt, etc.

AUSTIN, John: distinguished English writer on jurisprudence; b. Creeling Mill, 1790, March 3; d. Weybridge, 1859, Dec. 1. At the age of 16, he entered the army, and served as a subaltern in Sicily. He left the service after the peace, and in 1818 was called to the bar. In the year 1832 he published his *Province of Jurisprudence Determined.* In 1833, he was appointed by Lord Brougham, a member of the Criminal Law Commission, one of a class of bodies in whose efficacy he put

no faith. A. was afterwards appointed a member of a commission to inquire into the grievances of the Maltese. He returned to England in 1838, not in good health, and was advised to try the springs at Carlsbad. With his slender means, decent existence in England was scarcely possible, and he removed with his family to Germany. The revolution of 1848 drove him back to England and he settled at Weybridge, where he died. His lectures on the principles of jurisprudence, in manuscript and imperfect, were prepared for the press by his widow, and published 1861–63, under the title of *Lectures on Jurisprudence, being a Sequel to 'The Province of Jurisprudence Determined,' etc.* On this work rests his enduring fame.

AUS'TIN, Oscar Phelps: American statistician, chief of the bureau of statistics, department of commerce and labor; b. Illinois. At the age of 12 he removed with his parents to Nebraska, where he remained until manhood. He then engaged in journalism until his appointment as chief of the bureau of statistics 1898, May 9. He has since lived in Washington, serving as Washington correspondent for newspapers in New York, Chicago, and other cities. He is the author of *Uncle Sam's Secrets; Uncle Sam's Soldiers;* and other publications for the instruction of youth in national and international affairs; also of official monographs *Commercial China in* 1900; *Commercial Japan; Commercial Africa; Russia and the Trans-Siberian Railway; American Commerce; Commercial Alaska; Submarine and Land Telegraphs of the World; Colonies of the World and Their Government; Colonial Administration;* etc. He is associate editor of the *National Geographic Magazine.*

AUSTIN, Sarah (Taylor): translator of many of the best contemporary French and German works: 1793–1867, Aug. 8; b. Norwich, England: wife of John A. (q. v.), whom she married 1820. She was of a family noted for literary ability. Mrs. A. translated from the German *Characteristics of Goethe,* by Falk, etc., with notes (1833); *Fragments from the German Prose Writers,* with notes (1841); and *The Story without an End,* by F. W. Carove (several editions). She also translated from the German, Ranke's *Popes of Rome* and his *History of Germany during the Reformation.* Mrs. A. translated from the French M. Cousin's *Report on Public Education in Prussia* (1834), and M. Guizot's work on *The English Revolution* (1850). She published, 1839, a work *On National Education;* and in 1857, *Letters on Girls' Schools and on the Training of Workingwomen.*

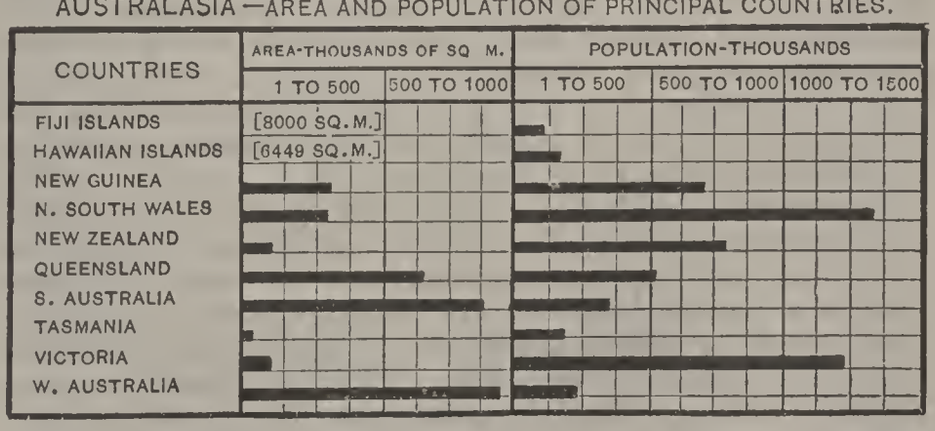
AUS'TIN, Stephen F.: Texan pioneer: about 1790–1836, Dec. 27; son of Moses A., of Conn. The father had obtained a grant of land from Mexico, with the intention of planting a colony there, but died before his plan was accomplished. The son gathered a company of followers in New Orleans about 1821, and led them to the present location of the city of Austin. A year or two later, he secured from the Mexican govt. all the

privileges which had been granted to his father. He was a skilful manager, and soon had a prosperous colony and a large area of excellent land. He not only kept the assoc. intact, but also dispersed the hostile Indians. Dissatisfaction with Mexican rule led 1833 to the formation of a constitution, which the govt. refused to ratify. A. was finally imprisoned, but was liberated 1835, and became commander-in-chief of the revolutionary forces. He was appointed commissioner 1835 to the U. S. govt., to obtain its recognition, and was succeeded in command of the army by Gen. Sam. Houston. Though he presented the case of his colony wisely and forcibly, he did not have the proper credentials, and his mission to Washington proved fruitless. He returned 1836, July, and renewed his efforts in behalf of the colony, but did not live to see its independence secured.

AUSTRAL, a. *aws'trăl* [L. *austral*—from L. *austrālis*, southern—from *auster*, the south wind: It. *australe*]: pertaining to the south. AUS'TRINE, a. *-trĭn*, southern. AUSTRALASIAN, a. *aws'trăl-ā'shan* [L. *austrālis*, and *Asia*]: pertaining to Australasia. AUSTRALIAN, a. *aws-trā'lĭ-ăn*, pertaining to Australia. AUSTRALINE, n. *aws'tră-lĭn*, the variety of oil of turpentine obtained from the *Pinus austrālis*, or P. *palus'tris*, ord. *Conif'erœ;* the liquid called *austra-terebin'thēne*, produced by neutralizing turpentine oil with an alkaline carbonate, which is then treated to a process of distillation.

AUSTRALASIA, *aws'trăl-ā'shĭ-a:* a term etymologically equal to *Southern Asia*, but generally used to indicate Australia and the neighboring islands, mainly Tasmania, New Zealand, Papua or New Guinea, New Caledonia, New Hebrides, New Ireland, and New Britain. The term would thus exclude the Malay Archipelago, Micronesia, and Polynesia proper; but some authors use A. so as to include these great groups of islands also, making the name therefore equivalent to *Oceania*. For the several islands, see the various titles.

AUSTRALASIA—AREA AND POPULATION OF PRINCIPAL COUNTRIES.



The Australasian group in the above exhibit comprises the 10 principal countries. The showing treats of area, in thousands of sq. m., and population in thousands. In this group appear the Hawaiian Islands, also the Fiji Islands.

AUSTRALIA.

AUSTRALIA, *aws-trā'lĭ-a*: by far the largest island of the Australasian group, and for extent describable as a continent, is in the form of a rectangle, though with some projections on the n. and s. sides; between 10° 39′ and 39° 1½′ s. lat., and between 113° and 153° 16′ e. long.; having a maximum length, from w. to e. (from Dick Hartog's Point to Point Cartwright), of about 2,400 m.; and a maximum breadth, from n. to s. (from Cape York to Wilson's Promontory), of 1,971 m.; 2,996,030 sq. m., about one fifth less than that of Europe, or more than twenty-six times that of Great Britain and Ireland. Its nearest point is separated from England by about 11,000 m. On the n. it is separated from New Guinea by Torres Strait, 90 m. broad, and the Arafura Sea, and from the Sunda Islands by the Indian Ocean; on the w. it is washed by the Indian Ocean; on the s. it is bounded by the Indian Ocean, and divided from Tasmania by Bass Strait, 140 m. wide; on the e. it is washed by the s. Pacific Ocean. This island-continent is, above all other continents, exceedingly compact, with an almost unbroken seaboard on the e. and w., which, notwithstanding, offers some good harbors on both these sides. Parallel with the e. coast, at a distance of about 60 m., stretches for 1,200 m. the Great Barrier Reef, offering but one safe opening for ships.

The sea encircling A. is, on the whole, remarkably shallow, especially on the n.; and, except on the s.e., reaches to a depth of only some 200 fathoms. At a distance of from 300 to 500 m. however, on the e., s., and w. coast, a depth of 15,000 ft. is attained. Bass Strait is rather dangerous for navigation.

Of rivers communicating between the coast and the interior, there are remarkably few. The mountains rising to any great elevation are all on the e. side; and there is but one great river, the Murray, collecting into itself (by the Darling and other great tributaries) almost the whole w. drainage of that e. range. The few straggling series of mountains on the w. side of the continent feed but a few short intermittent streams, and nearly the whole vast expanse, between that narrow, partially knotted selvage on the w., and the Murray Country (Queensland, New South Wales, Victoria, and the e. slip of South A.) on the e., is but a slightly relieved barren desert. The lack of natural irrigation over this arid area is aggravated by the enormous evaporation, which, for long periods, more or less dries up what rivers it possesses.

The eastern highlands of A., running parallel with the coast for some 1,700 m., now in a series of ranges, and now in a single chain or series of detached hills, are continued into New South Wales by the Warragong, or Australian Alps, where in Mount Kosciusko (7,308 ft.) the continent attains its highest elevation. Thence upland valleys merge northward into the Blue Mountains, which send offshoots toward the Liverpool Range, that, sweeping e. and w., curve round the s. edge of the lovely Liverpool Plains. The main chain skirting the e. of New England, runs n. to the frontiers of Queensland, where it branches into an e. arm, the Macpherson Range; and a w. arm, the

Herries Range. Inclosing the w. valley of the Brisbane river, and sinking northward to the valley of the Burnett, is the Dividing Range of Queensland, from whose w. side slope the Darling Downs. To the n. of the Brisbane and Condamine rivers, the highlands expand to their greatest breadth, but contract again to the n. of the Fitzroy river into a comparatively narrow chain, which sinks into the depression of the valley of the Burdekin. N. of this river, uplands, with an average elevation of 2,500 ft., again start n., terminating at 17° s. lat. In S. A., the Lofty Range skirts the e. of St. Vincent Gulf, and the Flinders Range the e. of Spencer Gulf and Lake Torrens.

Almost the whole of this vast region to the south-east of A. (the eastern part of South A., Victoria, New South Wales, and Queensland) is drained by the Murray and its tributaries, whose arterial system has an area of about half a million miles, as large as the Austrian empire. The Murray, rising in the Australian Alps, flows between Victoria and New South Wales, then through S. A., discharging, after a course of 2,400 m., into Alexandrina Lake. On its s. or left bank, it receives all the n. streams from the mountains of Victoria, the principal of which are the Goulburn and Loddon. On its n. or right bank, it receives all the s.w. rivers from the e. highlands, the principal being the Murrumbidgee (1,350 m. long), which also rises in the Australian Alps, and collects the waters of the Lachlan ; and farther w. the Darling (1,160 m.) which has for its tributaries the Barwan, Culgoa, and Warrego. N. of the Murray, the two most important rivers are the Fitzroy, and the Burdekin in Queensland. The other rivers to the e. of the e. highlands are short and rapid, unfit for navigation. All those hilly and partially river lands consist of grassy park-like uplands, clothed with scattered thin forests of magnificent trees, for the most part evergreen and vertical-leaved, diversified by bush and heath and scrub; all of excellent pasture, intersected by wide valleys of remarkable fertility well adapted for agriculture.

From the head of the Gulf of Carpentaria stretches a table-land westward along the border of the Gulf and the base of Arnhem Land, then s.w. along the coast, pierced by the Flinders river, the deep valley of the Alligator, the Roper, and the Victoria; the two latter navigable for a considerable length, and flowing through fertile lands and picturesque scenery.

West A., toward the coast, is in its n. half crossed by ranges, running mostly e. and w., of detached mountains, intersected by the fertile valleys of Ashburton, Gascoyne, and Upper Murchison. In its s. half, West A. is for the most part a barren tract of salt or mud steppes, almost destitute of fresh water, and extensively overgrown with dreary thickets. In the s. it is pierced by the Upper Swan river and the Blackwood. On the s. coast, from King George's Sound to Spencer Gulf, is neither mountain nor river.

To the n. of Spencer Gulf is an area of abt. 1,000 sq. m., 'the Lake District' of A., set with lakes not deficient in number; Torrens, straight to the n. of Spencer Gulf, over

100 m. long, with Eyre to the n. of it much larger, and Gairdner to the w. of it. To the e. of Eyre are Lakes Blanche and Gregory; and far to the northwest, Lake Amadeus. These dead masses of salt water fluctuate greatly in body as the season is dry or rainy, now sheets of water, and now almost grassy plains, set in the dreariest wide-spreading steppes. A comparatively verdant belt of country lies to the e. of this district, and runs to the extreme n. as the axis of A., along the telegraph line.

The whole interior of the country, with the exception of this axis-like belt, measuring about 1,500,000 sq. m., presents one vast dreary plain, sometimes of stifling, scorching, low-lying, deep-red sand-ridges; sometimes matted over for hundreds and thousands of miles with 'scrub,' a species of eucalyptus, growing to a height of 8 to 10 ft., occasionally higher—either the 'mallee,' a hard, dreary, sapless shrub, thickets of which are almost impenetrable, or worse still, the 'mulga.' Worst of all, however, is the 'spinifex' or 'porcupine grass,' lacerating the feet of horses and the clothes and flesh of men; a grass, which in one district alone, to the n. and n.w. of Lake Eyre, overspreads 10 degrees of latitude. To the e. of the central telegraph line, as far as to the w. plains of Queensland, is an unknown country, supposed to be sandy or otherwise uninhabitable.

Discovery and Settlement.—The earliest trace of A. in human records is found in a French chart of 1542, where it figures as 'Jave la Grand.' It is next distinctly referred to in a book by Cornelius Wytfliet (Louvain, 1598), in which it is conjectured to measure one-fifth of the world. The present Torres Strait refers to the presence of Torres there in 1606. Dick Hartog's Island in the west carries us back to Dick Hartog and the year 1616. Arnhem Peninsula is a reminiscence of the Dutch vessel *Arnhem*, which, 1618, explored the coast of that land. The Dutch ship, *Guldene Zeepard*, 1627, sighted a large part of the s. coast from Cape Leeuwin eastwards. The Gulf of Carpentaria is the memorial of General Carpentier's visit to those waters in 1628. In 1688, this land was first seen by British eyes (so far as now known) in the person of Dampier, who names an archipelago in the n.w. Nearly a century later (1770) Captain Cook, on his course of circumnavigation of the globe, explored the whole eastern coast from Gipps Land on the s.e. (in Victoria) to Cape York. This expedition stayed a week in 'Botany' Bay, while Sir Joseph Banks and Dr. Solander were collecting some thousand species of the wonders of Australian botany to show at home. Bass Strait, on the s., refers to a time twenty years later (1790), when Mr. Surgeon Bass was there with Lieutenant Flinders. In 1792, Flinders (who names a range of hills in South A., and a river in the north, discharging into Carpentaria) was surveying Moreton Bay and Hervey Bay; in 1801, Spencer Gulf and the Gulf of St. Vincent, and the coast on the e. and n. In 1800, Captain Grant, in 1802, Lieutenant Murray, surveyed Victoria; the latter discovering the bay of Port Philip, at the head of which now stands Melbourne. The exploration of the

AUSTRALIA
Scale of Miles
0 100 200 400 800
Longitude East from Greenwich
Engraved by the Atlas Eng. Co.
WESTERN AUSTRALIA
NORTHERN TERRITORY OF SOUTH AUSTRALIA
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
TASMANIA
INDIAN OCEAN
PACIFIC OCEAN
CORAL SEA
GULF OF CARPENTARIA
Great Australian Bight
Bass Strait
TROPIC OF CAPRICORN
Great Sandy Desert
Gibson Desert
Great Victoria Desert
Sandy Desert
NEW GUINEA
LOUISIADE ARCH
SOLOMON IS.
BARRIER REEF
PERTH
Fremantle
ADELAIDE
MELBOURNE
SYDNEY
BRISBANE
Palmerston
Rockhampton
Townsville
Broken Hill
Ballarat
Bendigo
Geelong
Newcastle
Goulburn
Gympie
Launceston
HOBART
NEW ZEALAND
Same scale as main map
Auckland
WELLINGTON
Christchurch
Dunedin
NORTH ISLAND
SOUTH ISLAND

whole coast was completed by the *Beagle* (in which Charles Darwin sailed), 1837–43.

The first British settlement having been made, 1788, at Port Jackson (on which Sydney now stands), inland exploration necessarily followed; but for the first 25 years was confined inside the Blue Mountains, to a district of some 50 m. in diameter. In 1813, however, that barrier was passed over, and the Fish river and Bathurst Plains were for the first time brought within the limits of civilization. Two years later (1815), the Lachlan river (tributary of the Murrumbidgee) was discovered, and traced 300 m. in a s.w. direction to a 'marsh.' Next the Macquarie (tributary of the Darling) was discovered, and followed likewise to a 'marsh'—experiences which suggested the theory of a sea in the interior of A. Mr. Oxley pushed exploration through New South Wales into Queensland, laying open the Brisbane river. In 1819, Hamilton Hume unveiled the Murrumbidgee; and in 1824, the Murray, thence traversing the country s. to Port Philip. Captain Sturt and he next followed the Macquarie to the Darling, and made known the junction of the Darling and Murray; then sailed down the Murray to its discharge into Alexandrina Lake. Major Mitchell tracked the Lachlan through the 'marshes,' discovered (1835) the Loddon (tributary of the Murray) and Wimmera (intermittent stream to w. of it), crossed the Grampians, descended the Goulburn to the Murray, and altogether surveyed the fairest and richest part of Victoria, 'Australia Felix,' as he admiringly named it. In 1839, Mr. Eyre (of the 'Jamaica massacre') discovered Lake Torrens (in South A.); and in 1840, after exploring its e. shores, and the Flinders Range to the s., accomplished a successful but most perilous and distressing march of 1,209 m. from Adelaide to King George's Sound. In 1844–5, Captain Sturt started from the Darling (130 m. above its confluence with the Murray), travelled 250 m. n.w., then n. to the Grey Ranges, over endless deep red sand-ridges, over a barren mud-plain, through 'Spinifex' (spiny lacerating 'porcupine grass'), to the margin of the blank of A., a 'terrible' country. In 1843–46, Leichardt explored Queensland from the s. borders to the Gulf of Carpentaria. In 1844, he crossed from Fitzroy river to the head of the Gulf of Carpentaria, whence he made his way w. along the n. coast as far as Port Essington. The next great successful feat (one of the greatest and most successful of all Australian explorations) was the passage across the whole continent, from s. to n., from Adelaide to a point w. of Chambers Bay, 1862, by M'Douall Stuart; opening the Albert river, the Finke river, the Macdonnell Ranges, the Ashburton Ranges, etc., altogether a quite practicable route across the continent through a fairly continuous, though narrow belt of upland and stream, a route utilized in 1872 for a telegraph line, with fixed stations. About the same time with this fortunate expedition, falls the most tragic one of Burke and Wills. Starting from Melbourne, these two explorers reached Cooper's Creek, the lower course of the interior Barcoo river. There, leaving the larger portion of their

cumbrous cavalcade, Burke and Wills pushed on, passing the M'Kinlay Mountains, and reaching the Gulf of Carpentaria, near the mouth of the Flinders, the first passage made across the continent. On their return journey, they perished miserably of starvation at Cooper's Creek. M'Kinlay, sent in search of the lost party, traversed the whole continent to Albert river, thence e. to Burdekin river and Port Denison. In 1861, F. F. Gregory explored 800 m. of the n.w. of A., at a distance of some 200 m. from the coast along the upper courses of the De Grey, Ashburton, Fortescue, and Oakover. The w. side of York Peninsula was explored by Jardine, 1864. The telegraph line of 1872, as a base or goal of adventure to or from the w. coast, could not but provoke expeditions to draw communicating lines between it and the w. coast. Accordingly, in 1872, Ernest Giles started from Chambers Pillar, near the Charlotte Waters telegraph station; but in spite of the most stubborn resolution, reached only 100 m. to the n. of Lake Amadeus. In 1873–4, starting 200 m. farther s. he reached half-way across to the w. coast. In 1873, however, Colonel Warburton, starting in April from Alice Springs (just n. of the tropic), arrived in Dec. of that year at Oakover river in Western A. In 1874, Forrest passed from Murchison river on the w. coast, to the telegraph line a little to the n. of Peake Station. In 1875, Giles crossed from the head of St. Vincent Gulf to Perth on the w. coast, having traversed 2,500 m. through a wholly unavailable country, for 1,000 m. of which he had to bore his way through interminable scrub. These expeditions demonstrated that the interior of A., between the w. of the Murray Country and the strip of elevated coastland to its n. and the e. of the narrow hilly border of Western A. was all little better than one hopeless desert, either unmitigated sand or vast frightful mattings of scrub or porcupine grass, the one considerable exception being the strip of the central telegraph line; and that, altogether, there was nearly a half of the continent which defied being made anything of.

The first civilized settlement in A. was at Botany Bay, 1788, by 1,030 persons, mostly convicts. In 1825, Moreton Bay (now Queensland) was settled as a part of New South Wales, attaining, 1859, Dec., the position of a separate colony. The settlement of Western A. (the Swan River Settlement, as it was then called) dates from 1829. It continued to be a penal settlement, 1851–68. Port Phillip (now Victoria), then a part of New South Wales, was first colonized 1835, and 1851, July 1, was constituted an independent colony. The colonization of South A. by British emigrants dates from 1836. A large proportion, it may be noticed, of the geographical nomenclature of A. is Scotch.

Geology.—The surface of A. rests on strata for the most part of palæozoic and cainozoic or tertiary formations, though mesozoic or secondary deposits also have of late been laid open in various quarters. In Victoria, the Grampians and Pyrenees (with the Ballarat gold-fields to the s.) in the s.w., the great Dividing Range running s.e.

and n.w. about the centre; the Warragong or Australian Alps in the n.e., and projecting into New South Wales; in New South Wales, the Blue Mountains; and in Queensland, the Dividing Range, are all mainly of Silurian formation, broken, however, by intrusive igneous rocks of granite, syenite, and porphyry. The same Silurian formation largely pervades South A., running in a broad diagonal from the s.e. coast, n.w. across the whole province. Though traps and granites occupy a large area to the s. and w. of Western A., traces of palæozoic formations are found in the Darling Range. No carboniferous rocks are known in South and West A. Detached sprinklings of metamorphic rocks occur in Queensland, along the central line of the continent from Ashburton to the Macdonnell ranges, and in the n.w. of Arnhem Land. The older settlements of New South Wales, including the coal-field of the Hunter river, rest on sandstone. Carboniferous strata, abounding in fine coal, and containing fossils of fish, corals, zoophytes, sigillaria, calamites, etc., extend over 50,000 sq. m. of Queensland, between 29° and 15° s. lat. The tin-mines of Queensland are imbedded in granite, rising through the carboniferous rock. Sandstone and limestone, of carboniferous or Permian formation, are in the s.e. of Victoria; and the two southern peninsulas of this province consist largely of limestone and carbonaceous deposits of mesozoic age. The secondary formation lies principally, however, in Queensland, where a cretaceous bed, having fossils of belemnites, ammonites, plesiosauri, and ichthyosauri, extends for about 200,000 sq. m., from near the Gulf of Carpentaria to the s. of the Darling river. The valley of the Wannon (which runs into the Glenelg river) is mesozoic, as is also the coal deposit of Parramatta to the s. of Sydney. The Clarence river, to the n. of New South Wales, runs through Trias.

Tertiary deposits, mostly pliocene, it is supposed, occupy an immense area of A., comprehending the desert sand stone, the coral limestone, and a large part of the conglomerates and clays of the gold-diggings. Western A., to the e. of the unstratified area, rests on desert sandstone, which also stretches n. and e. far into the interior, taking in likewise all South A. outside the diagonal Silurian bed above mentioned, penetrating into the interior plains of Victoria and New South Wales, and skirting the e. edge of the cretaceous strata of Queensland.

Quaternary deposits, forming 'flats' in the gold districts, occur in the Upper Macquarie and Upper Murrumbidgee rivers. These, with clay-deposits in the Liverpool Plains and Darling Downs of New South Wales, have yielded some very interesting fossils throwing light on the past fauna of A. A kangaroo, for example, has been found one-third larger than any kangaroo of the present times; also, a nototherium (an animal between the wombat and kangaroo) as large as a rhinoceros. Remains have been discovered also of a bird, named by Prof. Owen dromornis, larger than an ostrich, kindred to the now existing emu and cassowary.

Though there are no active, yet there are many extinct volcanoes in A. In South A., in Mount Gambier, are a large group which have broken through the horizontal coral beds, and whose craters now present beautiful lakes. In Victoria, a large part of the soil is basaltic, the débris of volcanoes of all periods, from the primary to the tertiary. Looking from any high eminence in the neighborhood of Ballarat, you may count extinct volcanoes by the score, some nearly closed up; but others having rims of some miles in circumference, from a few feet to 100 ft. deep, some rising 2,000 ft. above the sea.

The tertiary gold-drifts of A. extend through four epochs: the 'oldest,' 'older,' 'recent,' and 'most recent,' all belonging to the lower Silurian strata (the 'bottom,' or 'rock-drift,' as the miners call it); and contain the reefs or auriferous quartz from which the gold is extracted by crushing and amalgamation; the pure gold averaging about ½ oz., but sometimes amounting to 3½ oz., per ton. The miners are employed on drifts mostly of 200 to 500 ft. deep, at the bottom of which, in the 'gutters' (leads, or old river-beds), the precious metal is found. The 'oldest' drifts occur in patches, capping the Silurian heights. In the valley, above the first lava flow (which rests immediately on the Silurian bed-rock), is the 'older' drift. Above that is another lava flow, covered by the 'recent' drift; then over that, another lava flow, on which rests the 'most recent' drift.

The abundance of palæozoic deposits in the e. of A. suggests a great extension of land in that direction to supply the plants which their dimensions presuppose; and the Great Coral Reef along the e. coast indicates land which, it may be supposed, at one time formed part of the continent: similarly the shallow seas and numerous islands to the n. seem to indicate an ancient conjunction of A. with Asia. The abundance of mammalia entirely isolated from those of all other lands, the evidence that the strata of A. give of their greater opulence and no less uniqueness in the past than now, with the testimony of all other departments, all demonstrate the existence, during the tertiary epoch, of a much more fertile continent than the A. of the present age, and comprising lands now sunk beneath the sea. The flora of West A., so peculiar and so singularly rich, and its affinity in some degree with the flora of s. Africa, may point to a western extension of A. The islands of St. Paul and Amsterdam, lying between A. and the Cape, suggest to Mr. A. R. Wallace the relic of a past line of communication between the two lands.

Minerals.—Gold is distributed more or less through all the Australian colonies, but principally in Victoria, Queensland, and New South Wales. Diamonds and other precious stones have been found in different parts of the continent. The carboniferous strata of New South Wales, extending over a vast area, are very rich in coal, the coal-fields of that colony being among the most extensive in the world, containing also cannel coal and mineral oils.

The whole basin of the Hunter river, with its tributaries, down to Newcastle on the sea-coast, abounds in true coal of palæozoic age. Coal is found also at Cape Otway, and Western Port in Victoria, but belongs to the mesozoic formation, and is not of great value. In the s. of Queensland is an oolitic coal-field. Palæozoic coal, of great extent and great prospective value, has been discovered in the central regions of that colony, along the basins of the Mackenzie and Dawson rivers; while near Brisbane and the upper courses of the Darling Downs rivers, almost equally extensive and valuable beds of coal of mesozoic age have been found. Rich copper-mines have been opened in the palæozoic limestones of South A. They were discovered first near Adelaide. The most important mine, however, is that of Burra-Burra, 90 m. to the n., discovered 1842. A still more extensive deposit of copper-ore lies at Wollaroo, at the n. end of York Peninsula. In all, nearly 30 copper-mines have been opened in South A. Silver-lead has been worked near Cape Jervis (s. point of peninsula w. of Alexandrina Lake), and bismuth in the mountains of the Lofty Range to the e. of Adelaide. Lead exists largely in West A. Iron exists in large masses in West and South A., but in neither of these colonies has coal been found to work it. Very valuable tin-mines have been opened in Queensland, especially in the neighborhood of the Wild river, and n. of New South Wales. Lead, zinc, antimony, mercury, plumbago, etc., and building stones are also found in A. in abundance. Gold, however, continues to be the most valuable mineral product. The greatest quantity has been obtained in Victoria, but New South Wales and Queensland have also yielded a considerable amount. Probably there are rich stores of gold yet undiscovered.

Climate.—In proportion to its size, A., lying mostly within the temperate zone, has a singularly equable climate; in general, hot and dry, and remarkably salubrious. Within the tropics, it has its rainy season in summer (Nov. to Apr.); s. of the tropics, almost exclusively in winter. The principal mountains, both for extent and height, lying to the e. or windward side, absorb by far the heaviest tribute of moisture brought by the winds from the Pacific; and, as a rule, the amount of rainfall on the e. side is in inverse proportion to the distance from the e. coast. The w. side has far less rain than the e., and there the rainfall is proportionate to the proximity to the w. coast. Thus, Sydney has a mean of some 50 inches rain in a year, while Bathurst, 96 m. from the sea, gets only 23 inches; Deniliquin (287 m. removed) 20 inches, and Wentworth (476 m.) but 14 inches. Melbourne and Adelaide in the s. receive respectively 25 and 20 inches. The Queensland coast receives from 40 to 80 inches; the w. getting proportionately less. The elevated lands of West A. have about 30 inches rainfall. What moisture is left in the winds after their passage across the highlands, the intense heat rising from the central plains tends to dissi-

pate instead of allowing it to condense into rain. The parched traveller over those arid deserts looks up again and again into gathering clouds which argue possibility of rain, but never come to rain. South A., Victoria, and in a less degree, New South Wales, are exposed to winds from the interior likened to the 'blast of a furnace,' instantly raising the temperature of the lands they visit to as high as 115° or higher, and sometimes producing extensive bush fires. These hot winds are often followed by violent cold winds from the south known as 'southerly busters.' Melbourne has a mean temperature of 58°; Sydney, 63°; Adelaide, a little higher; Perth, about the same as Sydney. Captain Sturt found the mean temperature of the interior for three months over 101° F. in the shade, and the drought such as to unloosen the screws of his boxes, split his combs into thin laminæ, make the leads drop out of his pencils, and his finger-nails become brittle as glass. The e. highlands have a greater proportion of snow than their latitude and height would argue. The worst feature in the climate of A. is the total uncertainty and inequality of the rainfall in all parts of the continent, menacing the whole country with almost equally distressing alternations of drought and flood. Droughts sometimes completely wither up vegetation over large tracts of land, to the destruction of many thousands of cattle. The ordinary drought itself renders almost all the rivers of A., with the exception of the Murray proper, merely intermittent; shrunk for months together into straggling puddles, with or without some connecting thread of water. As *rivers*, they really cease to exist for a longer or shorter period every year. Even the Murray itself dwindles every summer to meagre proportions, and has been known in cases of specially severe drought to dry up into a concatenation of pools. The rainy season, on the other hand, swells these pools into terrific floods, inundating the country, and often destroying property. The caprices of Australian drought and flood so affect the lakes, that their conformation, extent, and depth are frequently changed. Lake George, for instance, 25 m. to the s.w. of Goulburn, was at one time a grassy plain, at another time 20 ft. deep, and again only 2 ft. deep. If only the weather could, within any approximate degree, be calculated on, there are, no doubt, many tracts in the interior which could be utilized.

Botany.—The vegetation of A. is altogether unique, standing at a long interval from that of all other quarters of the globe, but is exceedingly abundant in species. These, it is calculated, number about 10,000, of which 8,000 have been already determined; considerably more than are to be found in all Europe. A peculiarity of the trees covering its seaboard highlands is their uniform sombre olive shade, alike on upper and under surface; and the generally vertical direction of their foliage, which thus allows much freer entrance to the blazing summer sun. Another peculiarity of Australian vegetation is the 'scrub'—the 'mallee,' 'mulga,' and 'porcupine grass,' above referred to—which is the chief

matting of the desert, presenting a cheerless prospect, perhaps not one tree within visible distance, and scarcely a bird to be descried overhead in flight. There is one agreeable 'scrub' formed by the tea-tree, a flowering shrub, a species of melaleuca, abounding in all parts of A.; not so dense as the 'mallee,' and mingled with other flowering plants. Next is the 'heath,' composed of a dwarf shrub 2 ft. high, clothing tracts boggy in winter and dusty in summer, mingled with bushes of melaleuca and banksia (or 'native honeysuckle'), all bright colored and aromatic. Highlands are rich in wood, such as that of the gum-trees of the genus eucalyptus, growing to a height of 250 ft., with a girth of 12 to 20 ft. In the Dandenong Range, 40 m. e. of Melbourne, are many trees over 420 ft. high; one felled giant measuring 480 ft. Then in the s. and w., and even a little into the interior, though less abundantly there, are the valuable shea-oaks, beef-woods, or casuarines—leafless trees, with rigid drooping branchlets something like our 'horsetails,' their wood the color of beef (whence the name) and as good as oak. Grass-tree (xanthorrea) shoots up into a rugged stem, varying in height from 2 to 10 ft., is surmounted by a tuft of wire-like drooping foliage, from the centre of which rises a spike like a bulrush, flowering in winter into white stars. The 'wattles' or acacias, abounding everywhere in the country, and comprising 300 species, are also a most characteristic and grateful feature of A., with lovely yellow blossoms, generally fragrant. Australian bush is fragrant all the year. The traveller in the highlands of New South Wales, will not unfrequently light, in some sheltered valley or deep ravine, on a scene of luxuriant vegetation, such as that of Illawarra, 50 m. to the s. of Sydney, where palms rising to 70 or 100 ft., Indian figs draped with strange parasites, creepers, ferns, etc., and the loftiest trees, all are intermingled into a labyrinth of the most graceful forms and brilliant colors. The 'flame-tree,' with its clusters of red flowers, gives signal of the Illawarra Mountains to ships miles out at sea. The 'fire-tree' of West A., the only non-parasitical plant of the same order as our mistletoe, flames with orange-colored blossoms like a tree on fire. The *Stenocarpus Cunninghami* of Queensland presents one mass 50 ft. high of orange-tipped crimson stamens. The 'warratah' of New South Wales shows a single stem of 6 ft. supporting a crimson blossom, like a full-grown peony. The Alpine vegetation of the higher mountains in Victoria and New South Wales intermingles the ranunculus, geum, gentiana, gaultheria, etc., analogous to the Alpine plants of Europe, with the purely Australian oxylobium, brachycome, acacia, hovea, and bossiæa.

Zoology.—Zoology of A. is more peculiar than its botany. Mammalia of other lands are totally wanting here. Marsupials or pouch-bearing mammalia of A. have but opossums of America to represent them in other parts of world. There are 'no apes, oxen, antelopes, elephants,

rhinoceroses, or pigs; no cats, wolves, or bears; none even of the smaller civets or weasels; no hedgehogs or shrews; no hares, squirrels, porcupine, or dormice;' only some peculiar species of rats and mice, and the 'dingo,' a wild dog. The largest of the marsupials is the kangaroo, attaining a height of 5 ft., and a weight of 200 lbs. Smaller species are the wallaby, the hare kangaroo, and rat kangaroo. The fruit-eating bat, or flying fox, is found in New South Wales and Queensland. The shores of A. are frequented by Antarctic-like seals and sea-lions; and on the coast of Queensland is the dugong or sea cow. Then there are phalangers—nocturnal animals, feeding on leaves, and living in the hollows of trees. In the moonlight stillness of the forest, flying opossums may be seen gliding through the air. The flying-mouse, 'able to sleep in a good-sized pill-box,' is decidedly Australian. The tarsipes of West A. is a honey-sucker, no larger than a mouse, with extensile tongue. The koala of the e. districts is 2 ft. long, thick-limbed, and tailless. The wombat, the largest of the marsupials, next to the kangaroo, is 3 ft. long, feeds on roots and grass, burrowing deep in the ground, and is nocturnal. The 'native cats' are carnivorous marsupials, variously marked and spotted, but fierce and intractable, dwelling among rocks and in holes, and feeding on small mammals and birds. The ant-eater of West A. is of the size of a squirrel, beautifully white-striped, with long and rather bushy tail. It has 52 teeth, a greater number than in any other known quadruped, and feeds on ants. The platypus, having no teeth nor marsupial pouch, and inhabiting the rivers and lagoons of the s. and e. of A., is 20 inches long, having very short legs, and broad-webbed feet. From its flat head projects two flat horny jaws, like the bill of a duck.

The birds, though not quite so unique and strange a feature of A. as are its other mammalia, excel those of all other temperate lands for beauty of plumage and fineness of form. Passing over the splendid parrots and cockatoos, we note for their singularity of figure, or brilliancy of feather, the regent-bird, rifle-bird, fly-catcher, and lyre-bird. The abundant flora, conjoined with scarcity of fruit, in this isolated continent, develops flower-feeding birds wanting in other lands, such as the meliphagidæ or honey-suckers, and the tricho-glossidæ or brush-tongued lories. Peculiar to A. are, too, the megapodiidæ or brush-turkeys, the menuridæ or lyre-birds, and the atrichidæ or scrub-birds. The megapodiidæ do not sit on their eggs, but bury them under mounds of earth or vegetable matter, to be hatched by the sun or fermentation. The emu and cassowary of A. correspond with the ostrich of Asia and Africa. The podargi, of enormous mouth—'more-porks,' as they are called, from their singular cry—are a strange and unsightly Australian type. Among song-birds are the piping-crow or musical magpie, and the lyre-bird, with its mocking notes. Noteworthy for their curious habits are the satin-birds or bower-birds, which build their domiciles of twigs and branches, decorated with colored feathers, bones, and shells, some-

times several feet long, arched over at the top, and which are made the rendezvous of many birds of both sexes. Altogether, A. has 650 distinct species of birds to muster against Europe's 500. Of reptiles, A. has no less than 140 different kinds, its largest lizard measuring from 4 to 6 ft. A does not lack snakes. Though no vipers or pit-vipers are found, their place is filled by the elapidæ (a family including the Indian cobras), constituting two thirds of the snakes of A., all poisonous, though only five kinds are fatally so. The black snake of A. measures from 5 to 8 ft. long. A. abounds, moreover, in insects, beautiful and peculiar, though the butterfly is rare in the temperate zone, becoming numerous towards the tropics.

Aborigines.—Almost as much as its botany and zoology, the human natives of A. are isolated and peculiar, separated by a wide remove from the Papuans, the Malays, and the Negroes. Of a dark coffee-brown complexion, rather than actually black, the Australian stands not much short of the average European in height, but is altogether of much slimmer and feebler build; his limbs, in particular, very lean and destitute of calves (a defect common to dark races). His head is long and narrow, with a low brow prominent just above the eyes, but receding thence in a very marked degree. The nose, proceeding from a narrow base, broadens outwardly to a somewhat squat end, the eyes on either side of its thin root appearing drawn together The face bulges into high cheek-bones. The mouth is big and uncouth, the jaw-bone contracted, the upper jaw projecting over the lower, but with fine white teeth, the chin cut away. The whole head and face, and indeed the whole person, is covered with a profusion of hair, which, when freed of its usually enclogging oil and dirt, is soft and glossy. His ears are rather pricked forward. The effluvium of his skin, offensive in itself, is exaggerated by the fish-oil that he uses to anoint his person. The intellect of the Australian, directed almost exclusively on the means of procuring food, operates wholly within the range of the rudest bodily senses; but inside that elementary sphere, displays no little nimbleness and skill. He is unsurpassed in tracking and running down his prey; and his weapons, though most primitive, are well adapted to assist him in that purpose, as his rude culinary and domestic apparatus manifest equal skill. Indeed, he has some exuberance of rude sense, some imitative facility or elementary art, as may be observed in the crude figures of sharks, lizards, etc., carved on caves in the n.e., and on the rocks of New South Wales; as also in his language, which, within its very circumscribed sensuous sphere, is fairly expressive and complete; likewise in the facility with which he learns to chatter foreign languages. Outside this circle, however, all is blank to the Australian. He has no architecture, almost no weaving, no pottery, and may be said to have no religion. His sensations have hardly, if at all, reached the length of sentiments, far less sentimentalities. The man lords it over the woman, who is as much his property as is his 'boomerang' or 'dingo.' The male offspring is, indeed, in considerable estimation;

and a father will lament the death of his son for months, or even years. Old men and old or infirm women are mercilessly abandoned. In summer, the aborigines roam about naked, and sense of shame seems almost wholly undeveloped in them. Their decalogue is all reduced to the notion of property, wives being one item in a man's chattels, the stealing of which has a definite punishment meted out to it. Where caves abound, some of the tribes seek no further, but live in those ready-made tenements. Fixed habitations none of them have; at best, only a screen of twigs and bushes, covered with foliage or turf; sometimes logs of wood and turf serve for a few days' or weeks' shelter, till the pursuit of food calls them elsewhere. Thrift is unknown. Life of the Australian alternates between satiety and semi-starvation. In summer, he goes naked; in winter, he wraps himself in kangaroo skins. To hold his dowak or digging-stick, he binds a girdle of hair about his loins. For protection against scrubs, he hangs an apron of skins to the girdle. By way of food, he devours many animals alive, including lizards, snakes (of which the head is rejected), frogs, larvæ, white ants, moths. Other animals are roasted. The wife is bound to keep her lord in vegetable food; roots of wild yam, seeds of acacia, etc. If she fail to produce enough, she is liberally treated to maulings and spearings, so that a wife usually appears bruised and gashed all over. They have no cultivation and no domestic animals. The 'boomerang' is a flat stick 3 ft. long, curved at centre, which when properly thrown into the air among birds, jerks in zigzag, spiral, or circular fashion, usually bringing down a few. In addition they have the throwing-stick, flint-pointed spears, nets of sinews, fibres, or hair, water-skins, canoes. There is no government among this people outside that of the family, and no laws except traditionary rules about property. In the way of religion, they have little save their terror of ghosts and demons, and some superstitious traditional rights applicable to certain epochs in a man's life, more particularly at his burial. The boys of the tribe when they reach the age of 20 are tattooed or scarred. Felicity after death is the reward of proper burial. A man dying in battle, or rotting in the field, becomes an evil spirit. For their curious exogamous marriage customs, see TRIBE. Their language is sensuous, their abstraction tending only in the way of arithmetic as far as the number 5, and that itself an unusual stretch; the language is of polysyllabic formation; the accent falling on the penultimate is not inharmonious. Though it comprehends many divergent forms, all seem fundamentally connected, forming a group wholly isolated from any of the linguistic families of the rest of the world. Their language is well developed and sensuously copious and

expressive. Like almost all other savages, the native Australians are rapidly vanishing before the advance of civilization. The European settlers oust them out of all the more fertile and habitable lands, pressing them ever more into the desert of the interior; while the diseases and vices that they acquire from the new possessors are another potent factor of their destruction. The lowest estimate of their number, before European settlement among them, gives more than 150,000; the natives surviving, including half-castes, being numbered by official census at 20,915, though the number is probably much larger.

Population.—Area and population of the Australian Commonwealth by the census of 1901:

States.	Area in sq. m.	Pop.
New South Wales	309.175	1,354,846
Victoria	87,884	1.201,070
Queensland	668,497	406.596
South Australia	903,690	362,604
Western Australia	975,876	184,124
Tasmania	26,215	172,475
Total	2,971.337	3,771,715

Capitals of States with Population, 1901

Sydney	New South Wales	496,203
Melbourne	Victoria	496,079
Brisbane	Queensland	119.428
Adelaide	South Australia	163,436
Perth	West Australia	36,274
Hobart	Tasmania	24,655

Manufactures and Produce.—In 1905 there were 12,189 manufacturing establishments, capitalized at £65,000,000, employing 202,898 hands, whose wages are annually £14,500,000, using material valued at £43,000,000 and having an output, with the exception of butter, cheese and bacon, valued at £71,000,000. The pastoral industry plays the most important part in the resources and wealth of Australia. At the end of 1904 there were 65,822,918 sheep; 7,868,520 cattle; 1,595,256 horses; 1,062,253 pigs; about 65,000 angora goats; and about 4,200 camels. The value of the returns from the pastoral industry in 1904 was about £36,000,000, to which total sheep contributed about £20,500,000, cattle £7,000,000 and horses £3,000,000. The return from wool and sheep skins was about £20,500,000. The total value of the dairy and swine produce was £7,130,000. There are 9,365,022 acres under cultivation, of which 6,269,778 are sown to wheat, yielding in 1905, 68,000,000 bushels. Of the other crops the chief are maize, acreage 324,414, production, 8,118,530 bu.; oats, 493,317 acres,

production 8,787,545 bu.: other grain crops 160,181 acres, production 2,781,515 bu.; hay 1,367,321 acres, production 1,442,774 tons; potatoes 119,690 acres, production 310,565 tons; sugar cane 141,842 acres, production 1,526,629 tons; vines 65,673 acres, total gallons wine 5,631,479; all other crops 422,806 acres; and there are about 155,000 acres under orchards.

Mining.—Mining is a great and growing industry, though gold-mining has for several years been steadily declining. Gold is distributed more or less through all the colonies, and though the total output of Victoria has been more than all the other colonies combined, the output of Western Australia in 1905 was more than half the output of all combined during that year. The total yield of gold up to 1906 was £459,146,447; divided as follows: N. S. W. £52,235,286; Vict. £272,801,158; Queensland £61,618,291; S. A. £2,778,392; W. A. £62,686,475; Tasmania £6,026,845. The output in 1905 was 3,635,301 oz., of which W. A. produced 1,955,304 oz. The total value of the production of silver and silver-lead to 1905 was £42,207,356, of which the Broken Hill mines had produced almost £29,000,000 worth. Copper to the value of £40,385,700 has been produced, the output for 1904 being £1,628,206. Other articles produced have been ten to the value of £21,549,000; iron and other minerals annually to the value of about £800,000; coal to the total value of £51,571,997, the output in 1904 being valued at £2,328,748; and opals to the amount of about £125,000 annually.

Commerce.—The external trade of A. is rapidly increasing; in 1861 the imports amounted to £17,562,960 and the exports to £17,399,656, total £34,962,616; in 1905 the imports were £38,407,579 and the exports £56,750,347, total £95,157,926. Besides the oversea trade the interstate trade was as follows: imports £37,413,293 and the exports £37,413,293, thus showing a total of all imports of £75,820,872 and of exports of £94,163,640. Of the total trade 47 percent was with Great Britain, 23 percent with other parts of the British Empire and 30 percent with foreign countries. The chief exports were wool £19,822,216; gold £10,965,612; wheat £4,140,676; butter £2,447,133; copper £2,103,694; sheep skins 1,396,849; etc. Of the imports in 1904, £11,242,839 came in duty free and £24,574,155 were dutiable, the gross duty collected being £7,175,121. During 1904-5, 17,691 vessels of 29,150,962 tons (including the interstate, coastal and oversea shipping, but exclusive of river traders) entered and cleared the Commonwealth ports. In the foreign trade 1,976 vessels of 3,725,086 tons entered and 2,112 vessels of 3,719,331 tons cleared during 1905.

Railways, Post-offices and Telegraphs.—The first railway was begun in 1850 but not opened until 1855; by

1871 only 1,000 m. of track had been laid, but since that time construction has been carried on rapidly. On 1905, June 30, there were 13,580½ m. open for traffic, belonging to the government, costing in construction and equipment £133,268,947 and after paying expenses showing a net profit for the year of £4,515,789. In addition there were 1,131 m. of private lines constructed at a cost of £4,831,028. There were 6,074 post-offices on 1905, Jan. 1; 3,189 telegraph stations with 44,849 m. of line, 131,731 m. of wire and 549 m. of cable, and which sent during the year 10,900,284 messages. There were also 142 telephone exchanges with 64,885 m. of wire.

Religion and Education.—With the exception of New South Wales, where religious denominations all receive support from the govt. according to the strength of their membership, and in W. A., which constitutes a diocese of the Church of England, all religious sects in A. are self-supporting. In respect of numbers, Episcopacy is the dominant form of religion. Education has of late been rapidly diffused. In all the former colonies, education is either without cost and compulsory, or the primary schools are so liberally endowed by the govt., as to place elementary instruction within the reach of all classes; while libraries, museums, botanical gardens, schools of art, mechanics' institutes, etc., are multiplying in all the colonies under the liberal patronage of the several governments.

Finances.—The total revenue of the Commonwealth for the year ending 1905, June 30, was £11,317,766, of which £8,656,981 came from customs and excise, £2,630,905 from posts and telegraphs and £29,880 from other sources. The expenditure was: customs and excise department £256,060, military and naval defences £706,279, posts, telegraphs, and telephones £2,560,756, and other expenditures £461,497, total £3,984,562, to which must be added £333,725 for public works and buildings. Of the customs revenue stimulants furnished £2,050,648, and apparel and textiles £1,348,848; of the excise stimulants £753,529, tobacco and sugar each over £500,000. For the separate states the total revenue was £29,635,731 and the expenditure £29,040,339, a surplus of £595,392. Of public debts the Commonwealth has practically none, though it will ultimately have to recoup the several states for the posts, telegraphs, customs houses, stores, etc., which were taken over when the Commonwealth was established. The total amount of the State debts in 1905 was £227,637,163 with interest of £8,232,933 distributed as follows: N. S. W. £80,033,581; Vict. £51,819,962; Queensland £41,781,287; S. A. £28,593,645; W. A. £16,090,288; Tasmania £9,318,400. The total value of property is estimated at £981,979,000. The total deposits of the joint-stock banks was £34,968,383 (without interest) and £56,579,719

(with interest); and all liabilities amounted to £95,493,076. The total assets were £113,783,060. The savings banks had 1,072,853 depositors and £34,180,055 in deposits. Besides these there were numerous investment companies, and trading and commercial companies for which statistics are not available.

Government.—Prior to 1902 each colony formed a separate province, exercising its own administration, passing its laws, and levying its fiscal duties; and all of them exercising responsible government, except Western A., in which the executive council, as well as the governor, were exclusively the nominees of the home govt. The govt. in each colony consisted of the governor, representing and appointed by the queen; the legislative council, corresponding with the house of lords; and the legislative assembly, corresponding with the house of commons. The legislative council of New South Wales and Queensland was nominated by the crown; that of Victoria and South A. was elected by the inhabitants possessing a certain property qualification. The legislative assembly was in all four colonies, elected by manhood suffrage. In Western A. partly representative govt. was introduced 1870, through the appointment of a legislative council of 21 members, 7 of whom were nominated by the govt., and 14 by £10 householders. Imperial laws in all the colonies were in force, unless superseded by local enactments, and all acts passed by the local legislature had to receive the assent of the home govt. All votes were by ballot.

Australian Commonwealth.—The agitation looking toward a federation of the Australian colonies was begun in 1852. The first convention for this purpose was held at Hobart 1886, Jan., but this effort was abortive. Another convention consisting of representatives from all of the colonies (now states) was held in Melbourne in the early part of 1891, and adjourned April 9, after submitting a draft of a federal constitution for approval by the people. After five colonies, viz., New South Wales, Victoria, Queensland, South Australia, and Tasmania, had by legislative enactments 1889, Feb. 2, declared their desire for a federal union, an act was passed by the British parliament 1900, July 9, to establish the Commonwealth. As this act provided for the inclusion of Western Australia that colony joined the federation in the following month.

The constitution of the new Commonwealth thus agreed upon more nearly resembles that of the United States than any other, but it has also some not unimportant differences. The Commonwealth government is in the hands of a governor-general, who is appointed from time to time by the British cabinet to represent the sovereign, but who—like the sovereign himself in England—takes

no active part in the work of administration, but is guided solely by the advice of a cabinet, or ministry, consisting of members of the federal parliament and of whom there may be not more than seven at one time. No minister may hold office longer than three months unless he be a member of parliament.

The legislative power rests with the parliament, consisting of two chambers—a senate of thirty-six members, six from each state without reference to population; and a representative chamber consisting of seventy-two members, elected every three years by the people of the states, in proportion to their population as ascertained at each census. The senators are elected by the people of their respective states, not as here by the state legislatures, and hold office for six years, one half retiring every three years. The House of Representatives continues to exist for three years from its first meeting unless sooner dissolved by the governor-general. The control of taxation and finance resides in the representative chamber, the senate being empowered to pass or reject, but not to amend any act dealing with either the raising or appropriating of public money, as is the case with the two houses of the British parliament. The most novel provision of the legislative arrangement is a provision that in case a deadlock on any measure shall arise between the two chambers, which shall continue after a new election of the representative chamber, it shall be brought to an end by a joint sitting of the members of the two chambers, a simple majority of the votes of the whole number present deciding.

The powers of the federal executive and parliament are strictly confined to the subjects specified in the constitution; all others remain under the control of the states.

The federal government alone has the right to impose customs or excise taxation, and the postal and telegraph systems also fall into its hands. As the public debts of the various states, however, remain as at present state liabilities, provision is made for the return to the various states of all the revenue thus raised which is not required for federal purposes, in proportion as it is contributed by each. The railroads of the country, which are all state property, remain as at present under state control, subject to the provision that they may be used by the federal authorities at any time when needed for the conveyance of troops or for other defence purposes.

The first governor-general, the Earl of Hopetoun, was inaugurated at Sydney, 1901, Jan. 1. The Duke and Duchess of Cornwall and York visited Australia 1902, and the Duke carried out his mission of opening the first session of parliament of the Commonwealth at Melbourne May 9. in the presence of a vast assembly.

AUSTRIA, *aus'trĭ-a*, ARCHDUCHY OF: the cradle and nucleus of the Austrian empire, lies on both sides of the Danube, from the mouth of the Inn to Presburg, on the borders of Hungary; about 15,000 sq. m. It now forms three of the crown-lands, or administrative provinces of the empire—viz., Lower and Upper Austria (or Austria below, and Austria above the Ens), and the Duchy of Salzburg. See AUSTRIA, EMPIRE OF. The s. and w. portions are mountainous; the n. and e. are more level and fertile, containing the great plain of Vienna, the Marshfeld, etc. The chief towns, besides Vienna, are Wiener-Neustadt, Salzburg, Steyer, Linz, and Ischl (q.v.). Pop. (1890) 3,621,140, mostly German and Rom. Cath.

AUSTRIA, EMPIRE OF, or AUSTRO-HUNGARIAN MONARCHY: a compact territory with a circumference of about 5,350 m. The body of the empire is in the interior of Europe, though it has about 500 m. of sea-coast on the Adriatic. A. borders on Italy, Switzerland, Bavaria, Saxony, Prussia, Russia, Roumania, Servia, Turkey, and Montenegro. With the sanction of the Berlin Congress of 1878, the small territory of Spizza, on the Montenegrin frontier and formerly Turkish, has been incorporated with Dalmatia; the Turkish provinces of Bosnia and Herzegovina, though occupied and administered by Austria, cannot be regarded as part of the Austro-Hungarian monarchy. The following table shows the area and population of the empire at the census of 1900, Dec. 31:

PROVINCES.	Area: Eng. sq. m.	Population.	Pop. per sq. m.
Lower Austria	7,654	3,100,493	405
Upper Austria	4,631	810,246	175
Salzburg	2,767	192,763	69
Styria	8,670	1,356,494	156
Carinthia	4,005	367,324	91
Carniola	3,856	508,150	132
Coast land	3,084	756,546	245
Tyrol and Vorariberg	11,324	981,949	86
Bohemia	20,060	6,318,697	315
Moravia	8,583	2,437,706	284
Silesia	1,987	680,422	342
Galicia	30,307	7,315,939	241
Bukowina	4,035	730,195	181
Dalmatia	4,940	593,784	120
Total, Austria	115,903	26,150,708	226
Civil population:			
Hungary Proper	109,007	16,721,574	153
Croatia and Slavonia	16,423	2,400,766	146
Hungary	125,430	19,122,340	152
Population in active military service:			
Hungary Proper		116,681	...
Croatia and Slavonia		15,538	...
Hungary		132,219	...
Total population:			
Hungary Proper	109,007	16,838,255	154
Croatia and Slavonia	16,423	2,416,304	142
Total, Hungary	125,430	19,254,559	154
Total, monarchy	241,333	45,405,267	...

The above total includes the army and landwehr.

AUSTRIA-HUNGARY
SCALE OF MILES
0 20 40 60 80 100 120
BOHEMIA
MORAVIA
AUSTRIA
LOWER AUSTRIA
UPPER AUSTRIA
SALZBURG
STYRIA
TYROL
CARINTHIA
CARNIOLA
CROATIA AND SLAVONIA
BOSNIA
HERZEGOVINA
DALMATIA
HUNGARY
TRANSYLVANIA
GALICIA
BUKOWINA
SERVIA
BULGARIA
RUMANIA
MONTENEGRO
SWITZERLAND
LIECHTENSTEIN
VADUZ
ITALY
ADRIATIC SEA
LIGURIAN SEA
BLACK SEA
VIENNA
BUDA-PEST
Praque
Brunn
Gratz
Agram
Trieste
Lemberg
Szabadka
Szegedin
BUKHAREST
BELGRADE
SOFIA
Frankfort
Coburg
Wurzburg
Mayence
Nurnberg
Ratisbon
Strassburg
Ulm
Augsburg
Munich
Basle
Zurich
Constance
Innsbruck
Salzburg
Linz
Passau
Trient
Milan
Verona
Padua
Venice
Genoa
Bologna
Florence
Ancona
Grosseto
Rovigno
Pola
Fiume
Zara
Spalato
Ragusa
Cattaro
Scutari
Antivari
Durazzo
Corfu
Prevesa
Janina
Salonica
Monastir
Uskub
Mitrovitza
Novi Bazar
Seraievo
Mostar
Port Klek
Castelnuovo
Cetinje
Trebinje
Konietza
Fotcha
Vranduk
Travnik
Visoka
Varesh
Kladana
Dolnie Tuzla
Zvornik
Gradatchatz
Dobol
Banjaluka
Jaitza
Kliuteh
Bihacs
Ottochatz
Ostrotchatz
Carlopago
Gospich
Zeng
Novi
Neu Gradiska
Pitrinla
Karlstadt
Agram
Belovar
Slatina
Essek
Vukovar
Dalja
Nasice
Pozega
Zomlior
Temesvar
Nagy Kikinda
Zenta
Perjamos
Arad
Karlsburg
Hermannstadt
Kronstadt
Fogaras
Mediasch
Schassburg
Kokelburg
Tovis
Felvine
Vaskoh
Torda
Maros-Vasarhely
Csik Szereda
Klausenburg
Szaszregen
Dees
Bistritz
Galgo
Nagy Karoly
Szatmar
Nagy Banya
Kiralyhaza
Munkacs
Huszt
Nyiregyhaza
Tokay
Namenyi
Miskolcz
Fulek
Banreve
Losone
Detva
Kaschau
Unghvar
Homonna
Stanislawow
Kalusz
Stry
Drohobycz
Boryslaw
Sambor
Grodek
Lemberg
Zloczow
Brody
Rawa-ruska
Zolkiew
Rzeszow
Tarnow
Przemysl
Cracow
Dembica
Trzebinia
Auschwitz
Troppau
Oderberg
Teschen
Neu Sandec
Dukla
Sanok
Zbaraz
Tarnopol
Ostrog
Dubno
Proskurov
Huslatyn
Czortkow
Kamenetz-Podolsk
Buczascz
Zaloscze
Wolochyska
Chodorow
Bobrka
Rohatyn
Snyatyn
Nodworna
Kolomea
Czernowitz
Putilla
Radautz
Botushany
Suczawa
Paskani
Jassy
Bereny
Kardszeg
Szoboszlo
Ruszok-Ladany
Grosswardein
Mezotur
Szarvas
Szentes
Bekes Csaba
Holdmezo-Kis Jano
Vazarhely
Csongrad
Halas
Felegyhaza
Szalonta
Nagy Karoly
Kecskemet
Stahlweissenburg
Palota
Czegled
Totis
Gran
Raab
Komorn
Neuhausel
Pressburg
Baden
Oedenburg
Neunkirchen
Gaming
Gmunden
Ischl
Hallein
Kufstein
Kitzbuhel
Radstadt
Mittensill
Landeck
Sterzing
Brixen
Botzen
Meran
Lienz
Villach
Klagenfurt
Radmannsdorf
Friesach
Neumarkt
Leoben
Brück
Hartberg
Steinamanger
Kormend
Veszprim
Tihany
Bal. Bereny
Lelle
Kaposvar
Kanizsa
Pettau
Marburg
Strass
Gleichenberg
Cilli
Varasdin
Steinbrück
Laibach
Udine
Gorlitz
Riva
Roveredo
Pontebba
Tarvis
Kreuz
Barcs
Zakany
Funfkirchen
Siklos
Mohacs
Maria Theresiopel
Drave R.
Fiume
Adelsberg
Mottling
Karlstadt
Pitrinla
Ostrotchatz
Ottochatz
Carlopago
Gospich
Pago I.
Zara
Benkovazo
Sebenico
Spalato
Lissa
Curzola I.
Lagosta I.
Meleda I.
Lesina I.
Brazza I.
Lissa I.
Grossa I.
Elba
Corsica
Longitude East from Greenwich
Saaz
Teplitz
Aussig
Tetschen
Bodenbach
Reichenberg
Gablonz
Schweidnitz
Glatz
Oppeln
Czestochowa
Zukmantl
Leitomischl
Czaslau
Kolin
Pardubitz
Chrudim
Deutsch Brod
Polna
Prossnitz
Olmutz
Prerau
Tischein
Neumarkt
Sillein
Neu Sandec
Poprad
Iglo
Bartfeld
Eperies
Sz. Miklos
Gollnitz
Brics
Dolschau
Theissholz
Satoralja
Ujhely
Tokay
Erlau
Janas
Hajdu Boszormeny
Gyongyos
Hatvany
Waitzen
Schemnitz
Kremnitz
Neusohl
Skalitz
Wilfersdorf
Tyrnau
Neutra
Karpfen
Leva
Gran
Totis
Komorn
Neuhausel
Pressburg
Baden
Vienna
Krems
Zwettel
Gmund
Gopfritz
Horn
Eggenburg
Wagram
Mistelbach
Znaim
Iglau
Wessely
Neuhaus
Budweis
Budwitz
Krumau
Strakonitz
Wotitz
Tabor
Brod
Pilsen
Mies
Taus
Eger
Asch
Plan
Graun
Marienbad
Schlan
Brux
Gitschin
Lissa
Praque
Elbe R.
Auschwitz
Trzebinia
Cracow
Dembica
Rzeszow
Tarnow
Przemysl
Myslenice
Bochnia
Oderberg
Teschen
Neu Sandec
Dukla
Sanok
Zbaraz
Tarnopol
Ostrog
Dubno
Proskurov
Huslatyn
Czortkow
Kamenetz-Podolsk
Buczascz
Zaloscze
Wolochyska
Chodorow
Bobrka
Rohatyn
Snyatyn
Nodworna
Kolomea
Czernowitz
Putilla
Radautz
Botushany
Suczawa
Paskani
Jassy
Bereny
Kardszeg
Szoboszlo
Ruszok-Ladany
Grosswardein
Mezotur
Szarvas
Szentes
Bekes Csaba
Holdmezo-Kis Jano
Vazarhely
Csongrad
Halas
Felegyhaza
Szalonta
Nagy Karoly
Kecskemet
Stahlweissenburg
Palota
Czegled
Totis
Gran
Raab
Komorn
Neuhausel
Pressburg
Baden
Oedenburg
Neunkirchen
Gaming
Gmunden
Ischl
Hallein
Kufstein
Kitzbuhel
Radstadt
Mittensill
Landeck
Sterzing
Brixen
Botzen
Meran
Lienz
Villach
Klagenfurt
Radmannsdorf
Friesach
Neumarkt
Leoben
Brück
Hartberg
Steinamanger
Kormend
Veszprim
Tihany
Bal. Bereny
Lelle
Kaposvar
Kanizsa
Pettau
Marburg
Strass
Gleichenberg
Cilli
Varasdin
Steinbrück
Laibach
Udine
Gorlitz
Riva
Roveredo
Pontebba
Tarvis
Kreuz
Barcs
Zakany
Funfkirchen
Siklos
Mohacs
Maria Theresiopel
Drave R.
Fiume
Adelsberg
Mottling
Karlstadt
Pitrinla
Ostrotchatz
Ottochatz
Carlopago
Gospich
Pago I.
Zara
Benkovazo
Sebenico
Spalato
Lissa
Curzola I.
Lagosta I.
Meleda I.
Lesina I.
Brazza I.
Lissa I.
Grossa I.
Elba
Corsica
Longitude East from Greenwich
Saaz
Teplitz
Aussig
Tetschen
Bodenbach
Reichenberg
Gablonz
Schweidnitz
Glatz
Oppeln
Czestochowa
Zukmantl
Leitomischl
Czaslau
Kolin
Pardubitz
Chrudim
Deutsch Brod
Polna
Prossnitz
Olmutz
Prerau
Tischein
Neumarkt
Sillein
Neu Sandec
Poprad
Iglo
Bartfeld
Eperies
Sz. Miklos
Gollnitz
Brics
Dolschau
Theissholz
Satoralja
Ujhely
Tokay
Erlau
Janas
Hajdu Boszormeny
Gyongyos
Hatvany
Waitzen
Schemnitz
Kremnitz
Neusohl
Skalitz
Wilfersdorf
Tyrnau
Neutra
Karpfen
Leva
Gran
Totis
Komorn
Neuhausel
Pressburg
Baden
Vienna
Krems
Zwettel
Gmund
Gopfritz
Horn
Eggenburg
Wagram
Mistelbach
Znaim
Iglau
Wessely
Neuhaus
Budweis
Budwitz
Krumau
Strakonitz
Wotitz
Tabor
Brod
Pilsen
Mies
Taus
Eger
Asch
Plan
Graun
Marienbad
Schlan
Brux
Gitschin
Lissa
Praque
Elbe R.

Surface.—Three-fourths of A. is mountainous or hilly being traversed by three great mountain chains—the Alps, Carpathians, and Sudetes (q.v.), whose chief ridges are of primitive rock. The Rhætian and Noric Alps stretch from Switzerland to the Danube, and contain the highest points of the Austrian territories, the Ortler Spitze rising to 12,779 English ft. Their height declines gradually towards the e., where the Leitha Hills (3,000 ft.), overlooking the plain of Vienna, form the transition to the Carpathians. This chain rises on the left bank of the Danube, near Presburg, and sweeping in a curve, first e., and then s. through Transylvania, again meets the Danube. The highest point is Butschetje in Transylvania, where a height of 9,528 ft. is reached. The central part, or Tatra Mountains, are vast granitic masses, resembling the Alps in character; the highest of these is the Lomnitz, in the longitude of Cracow, 8,133 ft. The Alps are accompanied, n. and s., by parallel ranges of calcareous mountains, covering whole provinces with their ramifications. The Carpathians are lapped on their n. side by sandstone formations; mountains of the same character also occupy Transylvania. Springing from the n.w. bend of the Carpathians, the Sudetes run through the n.e. of Moravia and Bohemia, in which last the range is known as the Riesengebirge, or Giant Mountains. The boundary between Bohemia and Prussian Silesia passes over the Schneekoppe, the highest peak of these mountains, 5,275 ft. in height. Continuous with this range, and beginning on the left bank of the Elbe, are the Erzgebirge, or Ore Mountains, on the confines of Saxony; and veering round to nearly s.e., the range is further prolonged in the Bohemian-Forest Mountains, between Bohemia and Bavaria.—The chief plains of the Austrian empire are the great plains of Hungary (the smaller of these is in the w., between the offsets of the Alps and Carpathians, about 4,200 sq. m.; the other in the e., and traversed by the Danube and the Theiss, 21,000 sq. m.), and the plain of Galicia.

From the Gulf of Trieste to the s. point of Dalmatia, A. has a sea-line of about 1,000 m., not counting the coasts of the numerous islands, the largest of which is Veglia, 23 m. by 12. The chief lakes are the Platten See (about 400 sq. m.), and the Neusiedler See (about 100 m.), both in Hungary. The first is navigable by steamers, and both are rich in fish, and have fruitful vineyards around them. The Alps and Carpathians enclose numerous mountain lakes. The Long Lake in the Tatra Mountains lies at an elevation of 6,000 ft. The most remarkable of all is the Zirknitz Lake (q.v.) in Illyria. There are extensive swamps or morasses in Hungary. One connected with the Neusiedler See covers some 80 sq. m. Much has been done in draining morasses.

The leading rivers that have navigable tributaries are: the Danube (q.v.) which has a course of 849 m. within the Austrian dominions, from Passau, at the mouth of the Inn, to Orsova, on the frontier of Walachia; and receives,

on the right, the Inn, Traun, Ens, Leitha, Raab, Drau, and Save; and on the left, the March, Waag, Neutra, Gran, Theiss, Bega, and Temes: the Vistula (q.v.), with its tributary the Bug: the Elbe (q.v.), with the Moldau and Eger: the Dniester and Adige (q.v.) have no navigable tributaries; this last, which rises in the Rhætian Alps, and flows past the famous city of Trent, enters Lombardy above Verona, and confers on that country the benefits of what commercial importance it possesses—being navigable only up to a point below Legnago. The Rhine bounds the empire for only about fourteen m. above Lake Constance. The Isonzo, Zermagna, Kerka, and Narenta flow into the Adriatic.

The canal system of Austria is not extensive. The Vienna and Neustadt canal, in Lower Austria, has a length of 40 m.; the Bacser or Franz canal, between the Danube and Theiss in Hungary, 69 m.; and the Bega canal, constructed by the Romans, between the Bega and Temes, 83 m. Extensive lines are still capable of being opened, affording communication with many places now inaccessible, and rescuing tracts of arable land from inundations.

The *climate* of A. is on the whole very favorable; but from the extent and diversity of surface, it presents great varieties. In the warmest southern region between 42°–46° lat., rice, olives, oranges, and lemons ripen in the better localities; and wine and maize are produced everywhere. In the middle, temperate region from 46°–49°, which has the greatest extent and diversity of surface, wine and maize still thrive in perfection. In the n. region, beyond 49°, except in favored spots, neither wine nor maize thrives; but grain, fruit, flax, and hemp thrive excellently. The mean temperature of the year is, at Trieste, 58° F.; at Vienna, 51°; at Lemberg, in Galicia, 44°.

The raw products of A. are abundant and various; and in this respect it is one of the most favored countries in Europe. What one province lacks, another supplies. Its mineral wealth is not surpassed in any European country; it is only lately that Russia has exceeded it in the production of gold and silver. Mining has been a favorite pursuit in A. for centuries, and has been encouraged and promoted by the government. Bohemia, Hungary, Styria, Carinthia, Salzburg, and Tyrol take the first place in respect of mineral produce. Except platina, none of the useful metals is wanting. The mines are partly state property and partly owned by private individuals. The value of their yearly produce is estimated at about $45,000,000. Of this sum, coal yields about a half, iron a fifth, salt a tenth, and gold and silver together one-fourteenth. The number of persons employed in mines and smelting-works is about 150,000, a third in Hungary. Gold is found chiefly in Hungary and Transylvania, and in smaller quantity in Salzburg and Tyrol. The same countries, with Bohemia, yield silver. The discovery of quicksilver at Idria (q.v.) first brought this branch of

mining industry into importance. This metal is now also found in Hungary, Transylvania, Styria, and Carinthia. Copper is found in many districts—tin, in Bohemia alone. Zinc is got chiefly in Cracow and Carinthia. The most productive lead-mines are in Carinthia. Iron is found in almost every province of the monarchy, though Styria, Carinthia, and Carniola are chief seats. The production, though great, is not yet equal to the consumption. Antimony is found only in Hungary; arsenic is found in Salzburg and Bohemia; cobalt in Hungary, Styria, and Bohemia; sulphur in Galicia, Bohemia, Hungary, Salzburg, etc.

A. is peculiarly rich in salt. Rock-salt is in immense beds on both sides of the Carpathians, chiefly at Wieliczka (q. v.) and Bochnia in Galicia, and in the county of Marmaros in Hungary, and in Transylvania. Salt is also made at state salt-works by evaporating the water of salt-springs. The chief works are those at Ebensee, Aussee, Hallstadt, Ischl, Hallein, and Hall in Tyrol. A considerable quantity is made also from sea-water on the coasts of the Adriatic. The sale of salt is in A. a government monopoly. Of other salts, alum, sulphate of iron, and sulphate of copper are the chief. There are inexhaustible deposits of coal in the monarchy; but they have not yet been rightly explored, nor are nearly all that are known yet worked. They are spread over all the provinces; but the richest are in the mountain-systems of Moravia and Bohemia. Of recent years, however, much has been done to develop this branch of mining. A. has abundance of mineral springs, frequented for their medicinal qualities; 1,600 are enumerated, some of them of European reputation, as the sulphurous baths of Baden in Lower A., the saline waters of Karlsbad, Marienbad, and Ofen, etc.

The *vegetable productions*, as might be expected from the vast variety in the soil and position of the different provinces, are extremely various. Although three-fourths of the surface is mountainous, more than five-sixths is productive, being used either for tillage, meadows, pasture, or forest. Grain of all kinds is cultivated, most abundantly in Hungary and the districts s. of it on the Danube; in Bohemia, Moravia, Silesia, and Galicia. Agriculture is not far advanced; the prevailing system is still what is called the three-field system, introduced into Germany by Charlemagne, in which a crop of winter wheat is followed by one of summer grain, and that by fallow. In Hungary, the Magyar adheres to his primitive husbandry, the German and Slav are adopting rational methods. Rice is cultivated in the Banat, but not enough for the consumption. Potatoes are raised everywhere; and in elevated districts are often the sole subsistence of the inhabitants. Horticulture is carried to great perfection; and the orchards of Bohemia, A. proper, Tyrol, and many parts of Hungary, produce a profusion of fruit. Great quantities of cider are made in Upper A. and Carinthia, and of plum-brandy in Slavonia. In Dalmatia, oranges and lemons are produced, but not sufficient for the requirements of the country; twice as much olive-oil is imported as is raised in the monarchy.

In the production of wine, A. is second only to France. With the exception of Galicia, Silesia, and Upper Austria, the vine is cultivated in all the provinces; but Hungary stands first, yielding not only the finest quality of wine, but four-fifths of the whole produce of the empire.

Of plants used in manufactures and commerce, the first place is held by flax and hemp. Flax is cultivated almost universally; white hemp in Galicia, Moravia, and Hungary. Tobacco is raised in great quantities, especially in Hungary, which is first also in the cultivation of rape-seed. Bohemia raises hops of the first quality, which are partly exported; though other provinces require to import from abroad. The indigo plant has been lately successfully acclimatized in Dalmatia. Nearly a third of the productive surface is covered with wood (66,000 sq. m.), which, besides timber, yields secondary products, as tar, potash, charcoal, bark, cork, etc.

As to *animals*, bears are found in the Carpathians, Alps, and Dalmatia; wolves, jackals, and lynxes in the same districts, and also in the Banat, Croatia, Slavonia, and the Military Frontiers.—The marmot, otter, and beaver also are found in Dalmatia. Game has of late sensibly diminished. The wild goat lives in the highest, the chamois and white Alpine hare in the middle regions of the Alps and Carpathians. More productive than the chase are the fisheries of the Danube, Theiss, and numerous streams, lakes, and ponds. The chief sea-fishing is in Dalmatia. Leeches, procured chiefly in Hungary and Moravia, are an article of trade. For foreign commerce the most important branch of rural industry is the rearing of silk. A. produces about a quarter of a million of silk cocoons annually. The silk trade is very extensive in the Tyrol—the yearly supply of cocoons in that country being 32,000.

The breeding of *domestic animals* has not yet equaled what home wants require. In some districts it is excellent, in others neglected. Horse-breeding is promoted by what are called 'military studs.' Besides a number of imperial studs, there are many private establishments, especially in Hungary, for the same purpose. The supply of black-cattle is not equal to the demand; great numbers are furnished by Hungary and Galicia. The breeding of sheep, like that of horses, has been a special object of care to the government. The finer wools are furnished by Moravia, Bohemia, Silesia, Lower Austria, and great part of Hungary and Galicia. The great mass is, however, composed of what is known as middling and inferior sorts. Goats are reared chiefly in Dalmatia, and swine in Hungary.

Population.—Principal cities, 1900, Dec. 31:

Vienna	1,674,957	Szabadka	82,122
Buda-Pesth	732,322	Delreczen	75,006
Prague	201,589	Pilsen	68,079
Lemberg	159,877	Czernowitz	67,622
Gratz	138,080	Pozsony	65,867
Trieste	134,143	Zagrab	61,002
Brunn	109,346	Hodmezo-Vasarhely	60,883
Szeged	102,991	Linz	58,791
Kraku	91,323	Kecskemét	57,812

The following shows the distribution of pop. 1900:

Austria by language:	
German	9,170,939
Bohemian, Moravian and Slovak	5,955,397
Polish	4,259,152
Ruthenian	3,375,576
Slovene	1,192,780
Servian and Croatian	711,380
Italian and Latin	727,102
Roumanian	230,963
Magyar	9,516
Hungary by language:	
Hungarian (Magyar)	8,679,014
German	2,114,423
Slovak	2,008,744
Roumanian	2,785,265
Ruthenian	427,825
Croatian	1,667,377
Servian	1,045,550
Others	394,142

Combining both countries, the distribution was about as follows: Germans 11,285,000; Hungarians 8,700,000, Bohemians, Moravians, and Slovakians 7,964,000; Poles 4,259,000; Ruthenians 3,804,000; Servians and Croatians 3,424,000; Roumanians 3,025,000; Slavonians 1,200,000; Italians 725,000; and all others 395,000. In Cisleithania or A. proper the inhabitants averaged 80 to each sq. kilometre, and in Transleithania or Hungary 54. Despite the efforts of the govt. to obstruct or prevent emigration, the exodus shows steady increase.

Religion.—Religious bodies in A. are regulated by the statutes of 1867 and 8, and though the Rom. Cath. Church predominates, full liberty of faith and conscience is secured to all religious bodies legally recognized. The right to grant legal recognition is vested in the minister for ecclesiastical affairs, who must be convinced that the applicant body has nothing in doctrine, worship, constitution, or designation that is illegal or immoral. Religious liberty, as far as concerns public worship and preaching, does not extend beyond the limits of those bodies which have been granted official recognition. All other bodies are restricted in their rights of assembly to such meetings as can commune privately in households. Serious hindrances are thus put in the way of missionary enterprise. The bodies recognized are: the Rom. Cath.; Old Cath.; Greek-Oriental; Evangelical (Augsburg or Lutheran and Helvetian or Reformed): Evangelical Brotherhood; Gregorian-Armenian; and Jewish. In Hungary the legally recognized religions are: Rom. Cath.; Evangelical (Augsburg and Helvetian); Greek-Oriental; Gregorian-Armenian; Unit.; and Jewish, and all these have perfect equality.

Education.—The intellectual culture of the people is at very different stages of advancement among the different races. It is highest in the German provinces and lowest in the east. In Upper and Lower Austria, Salzburg, Tyrol, Moravia, Silesia, and Bohemia, almost all the children of suitable age are in attendance on the public schools: while in Bukowina only about 34, and in Galicia about 59 per cent. of them are at the schools. The educational

system has been entirely remodeled in recent times. The elementary schools, or those in which the common branches are taught, are designated national schools or schools for the people (*Volksschulen*), and there children have to attend from the end of their 6th to the end of their 14th (in some provinces only their 12th) year. A higher class of elementary schools are known as town schools (*Bürgerschulen*), in which a superior education may be obtained. For the training of instructors for the people's schools, there are 43 normal schools for male teachers and 26 for female. As secondary schools or institutions of a more advanced grade there are the gynmasia and the 'real-schools,' as they are called. The gymnasia resemble the best sort of our grammar schools, being intended chiefly to prepare pupils for the universities, great attention being paid in them to the classical languages. In the real-schools a more practical end is kept in view, and modern languages and physical science form the ground-work of the educational course. A complete course in a gymnasium extends over four years, in a real-school either three or four. There are also schools of an intermediate stamp known as 'real-gymnasia.' The higher education is provided for by the universities, the polytechnic institutes, and the various institutions in which particular subjects are taught. There are 11 universities in the monarchy, namely, in Vienna, Prague (two—a German and a Bohemian), Pesth, Gratz, Cracow, Lemberg, Innsbruck, Klausenburg, Agram, and Czernowitz. Most of these have four faculties—Catholic theology, law and politics, medicine, and philosophy. There are also several technical high schools in which mathematics, physics, and natural science are the chief objects of study. Besides these there are theological institutions; schools for jurisprudence and philosophy; schools of commerce, industrial arts, agriculture, . arboriculture, and mining; military schools, naval schools, art schools, conservatories of music, etc. The principal libraries are the royal library at Vienna, with 450,000 volumes, 24,000 manuscripts, and 7,000 incunabula; and the university libraries of Vienna and Prague.

Manufactures and Commerce.—Manufactures are in the most flourishing condition in Bohemia, Moravia, Silesia, and Lower Austria; less so in the eastern provinces; and insignificant in Dalmatia, Bukowina, and the military frontiers. The total money value of manufactured products amounts to at least $450,000,000 the value of agricultural products to more than $1,000,000,000. As regards the individual branches of manufacture, there are machines produced yearly to the value of $20,000,000 to $25,000,000 and the supply about equals the demand. In the manufacture of musical and scientific instruments Austria holds a high position; those of Vienna are especially celebrated. The manufacture of stoneware and chinaware is very extensive, giving rise to a brisk export trade. The glass manufacture is one of the oldest and most highly

developed branches of industry in Austria. The manufactories are spread over the whole of the monarchy, but are most numerous in Bohemia, where glass and glasswares of every kind are produced; a very considerable quantity is exported. The manufacture of metal goods is carried on to a great extent and some of the iron and steel goods, such as scythes and reaping hooks, have a world-wide reputation. The manufacture of gold and silver plate and jewelry is also important, and the articles of Vienna workmanship compete successfully with the French. The production of chemicals reaches the amount of $25,000,000 and about covers the home demand. As regards articles of food, the sugar from beets has an annual value of about $60,000,000; of beer the production is $20,000,000 in value, the number of breweries is over 2,000; spirits are distilled to the value of $17,500,000. The manufacture of tobacco is a state monopoly, and is carried on in 38, mostly large, establishments. Of textile industries, the silk manufacture, since the loss of the Lombardo-Venetian provinces, has become greatly limited. The manufactures of woolen, hemp, and flax are among the oldest and most important of the state. The linen manufacture (including also hemp and jute) gives employment to a greater number of persons than any other branch of industry (many of them in their homes), and produces goods to a greater value. The chief seats of the manufacture are Bohemia, Moravia, and Silesia. The annual produce of the cotton manufacture is next in value to that of woolens. Tanning is carried on to the greatest extent in Moravia, Lower Austria, and Bohemia, yet not sufficiently to supply the demand. The manufacture of leather goods, however, is very large, and in the production of gloves (in Vienna and Prague) Austria stands next to France.

In addition to the general import and export trade, Austria carries on,—partly from its central position in the continent of Europe, and partly from its numerous navigable streams, excellent roads, and in later times its partially completed railway system,—a very considerable amount of business in the transit of goods through her territory to other countries. The principal import is raw cotton; wool, cotton and woolen yarn, silk and silk goods, tobacco, coal and coke are also imported. Wood is the chief article of export, sugar and cattle, grain, and leather wares are among the other exports of importance. Nearly one half of the commerce of Austria is carried on with Germany, the next places being occupied by Great Britain, Italy, Russia, and the United States. The principal ports of the empire are, Pola, and Fiume.

During 1902 the total exports from the monarchy amounted to $382,500,000, which was $5,400,000 more than the value of the exports in 1901, and the total imports amounted to $344,760,000, being $14,240,000 more than in 1901. The balance in favor of the monarchy amounted to $37,740,000, a decrease of $8,840,000 from the balance of 1901, due to the striking rise in imports,

the increase in 1902 of imported raw materials for manufacturing was especially notable; cotton gained $4,820,000; wool and worsteds $4,560,000.

As to *form of government*, A. is a monarchy hereditary in the House of Hapsburg-Lothringen. In the case of the reigning family dying out, the states of Bohemia and of Hungary have the right of choosing a new king; but for the other crown-lands, the last sovereign appoints his own successor. The reigning house must profess the Rom. Cath. faith.

Till 1848, Hungary and Transylvania had a constitution limiting the monarchy, which was absolute for the rest of the empire; though the several provinces had each its consultative council of clergy, nobles, and burghers. After the Revolution of 1848, and the subsequent reaction, all marks of independence of the separate provinces disappeared. The imperial constitution granted (*octroyirte*) 1849, March 4, as well as the provincial constitutions that followed, were abolished, and government was organized in the most absolute form by the imperial 'patent' or charter of 1851, Dec. 31. The patent guaranteed to every religious body recognized by law protection in the observance of public ordinances, in the management of its own affairs, and in the possession of buildings and funds for the purpose of worship and instruction. The relation of the Rom. Cath. Church to the state was put upon a new footing. It was no longer under the oversight of the secular authority, the *placetum regium* and church-patronage were abolished, ecclesiastical jurisdiction for discipline, and the independent administration of church-property, were conceded, and the intercourse of bishops and of all Rom. Catholics with Rome left free. The clergy had no longer to submit to examination or tests on the part of the state; they were nominated by the state but only with the concurrence of the bishops, and without that concurrence they could not be deprived of their office. With all this they obtained an overwhelming influence over education, even in the universities; and by the concordat signed early in 1856, this influence was very greatly increased. The patent further guaranteed the equality in the eye of the law of all citizens, irrespective of nation, rank, or religion, and the liberation of the land from all serfdom. Subsequent patents (e.g. for Hungary, Croatia, etc., 1853) regulated the claims between existing proprietors and their vassals, and determined the indemnities due to the former for their seignorial rights.

But since 1867, Austria has been reconstructed as a twofold empire, consisting of a German or 'Cisleithan' monarchy, and a Magyar or 'Transleithan' kingdom. The former is generally known as Austria proper, and the latter as Hungary. Each of the two countries has its own laws, parliament, ministers, and government; and the formal tie between them is a body known as the Delegations. These form a parliament of 120 members, one half is chosen by the legislature of German Austria, which is represented by

it, while the other half represents Hungary. The person of the sovereign is another knot in the tie between the two members of the empire. The Magyars claim, under certain conditions, the right of freely electing their monarch. The Delegations have jurisdiction over all matters affecting the common interests of the two countries, especially foreign affairs, war, and finance; the ministries of which three departments are responsible for the discharge of their official functions to the Delegations, a committee of whom sits permanently. The acts of the delegations require to be confirmed by the representative assemblies of their respective countries; and in this manner it is attempted to provide for the self-government of both Austria proper and Hungary.

The administration of Austria proper is divided at present among seven ministries—Public Education and Ecclesiastical Affairs, Agriculture, Finance, Interior, National Defense, Commerce, and Justice. Formerly the ministry was merely the collective organ of the emperor, and was responsible to him alone. But a bill passed by the Reichsrath, 1867, and sanctioned by the emperor, renders it responsible to that parliament of the western empire.

The Reichsrath consists of an upper and a lower house. The upper house is constituted by princes, nobles, archbishops, bishops, and life members nominated by the emperor. The lower house numbers 425 members, elected by the 14 provincial diets of the empire in the following proportions: Bohemia, 110; Dalmatia, 11; Galicia, 78; Higher Austria, 20; Lower Austria, 46; Salzburg, 6; Styria, 27; Carinthia, 10; Carniola, 11; Bukowina, 11; Moravia, 43; Silesia, 12; Tyrol, 21; Vorarlberg, 4; Istria, 5; and Triest, 5. The members of the Reichsrath are elected in the provincial diets, and no one who is not a member of one of these is eligible to the wider sphere of legislation. The emperor nominates the presidents and vice-presidents of both houses. The rights claimed by the Reichsrath are: 1. *Consent* to all military laws; 2. *Co-operation* in legislature affecting trade and commerce, customs, banking, posting, telegraphs, and railways. 3. Examination of the estimates, and general control of the public debt. To give validity to bills passed by the Reichsrath, the consent of both chambers is required, as well as the sanction of the emperor. The Hungarian Reichstag corresponds to the Reichsrath of the Cisleithan provinces, and accordingly only deals with such matters as are common to the provinces belonging to the Hungarian crown. Transylvania is, so far as legislation and administration are concerned, entirely incorporated with Hungary. Croatia and Slavonia, however, have a Landtag or diet of their own, which consists of only one chamber, and is competent to deal with all matters belonging to the interior administration of the provinces, with religion and education, and the administration of justice.

The executive of Hungary is administered in the name of 'the king' by a responsible ministry.

Finances.—In the year 1902 the revenue and

expenditure of the monarchy for purposes in common amounted to $78,950,000. A. had revenue $358,275,000 and expenditure $358,100,000; Hungary had revenue $226,437,500 and expenditure $226,406,250; Croatia and Slavonia had revenue $3,950,000 and expenditure $39,250,000; and Bosnia-Herzegovina had revenue $9,075,000 and expenditure $9,050,000.

*History.**—The nucleus around which this great empire has grown was that part of the Archduchy of A. that lies below the Ens. In the age of Charlemagne, about 800, the defense of the s. e. frontier of Germany against Asiatic hordes gave rise here to a Margraviate, called the Eastern Mark or boundary of the empire, or Ostreich (Austria), the eastern govt.; which, being united in 1156 to the country above the Ens, was raised to a duchy. After coming, 1282, into the possession of the house of Hapsburg (q.v.), it rapidly rose to a powerful state. The princes of that house extended their dominion by marriage, purchase, and otherwise, over a number of other states, and from 1438 held almost uninterruptedly the throne of the German empire. By the acquisition (1526 and '27) of the crowns of Bohemia and Hungary, the House of A. rose to the rank of a European monarchy. In 1804, Francis declared himself hereditary Emperor of A., and, two years afterwards, laid down the title of Emperor of Germany and King of the Romans.

In the earliest times, what is now the Duchy of A. was inhabited by the Taurisci, a Celtic people; but their name subsequently disappeared before that of the Norici. After the conquest of the Norici by the Romans (B.C. 14), the country to the n. of the Danube belonged to the kingdom of the Marcomanni (q.v.); on the s. of the river lay the Roman provinces of Noricum and Pannonia, in which last was the municipal city of Vindobona (Vienna). Tyrol formed part of Rhætia. All these boundaries were swept away by the irruption of the northern peoples; and the regions in question were occupied in succession, during the 5th and 6th c., by Boii, Vandals, Goths, Huns, Lombards, and Avari. After the Lombards had settled in Italy, the Ens came, about 568, to be the boundary between a tribe of German origin and the Avari, a people who had penetrated thither from the east. The Avari having, 788, crossed the Ens, and fallen upon Bavaria, then part of the Frankish empire, Charlemagne drove them back (796) as far as the Raab, and united the district from the Ens to that river with Germany, under the name of the East Mark, Marchia Orientalis, or Austria. He sent colonists, mostly Bavarians, into the new province, and appointed over it a margrave. It came into the possession of the Hungarians in 900, but was reconquered by Otto I., 955, and reunited with Germany.

As margrave of the reconquered province, the emperor,

* As the history of A. and its rulers involves, for many centuries, the main strand of the thread of European history, it is given at somewhat more than the usual length.

983, appointed Leopold of Babenberg (q.v.), whose dynasty ruled A. for 260 years. Under Henry Jasomirgott (1141–77), the Mark above the Ens was annexed to the Lower Mark, the united province raised to a duchy, and important privileges conferred on the newly named duke and his heirs. This Henry Jasomirgott took part in the second crusade; he also removed the ducal residence from Leopoldsberg to Vienna, now first called a city, and began the building of the cathedral of St. Stephen. Under his successors, numerous additions (Styria, Carniola) were made to the possessions of the house. Leopold VI. undertook numerous expeditions against the Hungarians and the infidels, and is reckoned the best of the Babenberg princes. The line became extinct with his successor, Frederic, who fell in battle with the Magyars (1246).

Then followed an interregnum, 1246–82. The Emperor Frederic II. at first treated the duchy as a lapsed fief of the empire; shortly, claims were set up by Count Hermann of Bavaria, who was married to a niece of the deceased margrave, Frederic; and when Hermann died, and the empire was distracted by the contests between rival emperors, the 'States' of A. and Styria chose Ottokar, son of the Bohemian king, as duke, who made good his nomination about 1260. Ottokar, refusing to acknowledge Rudolf of Hapsburg as emperor, was defeated, and lost his life and possessions, in the battle of Marchfeld (1278); and the emperor shortly afterwards (1282) conferred the duchies of A., Styria, and Carinthia on his son Albrecht.

The accession of the Hapsburg dynasty with Albrecht I. (q.v.) was the foundation of A.'s subsequent greatness. The despotic Albrecht contended successfully with Hungarians and Bavarians, but while attempting to subdue the Swiss, he was murdered near Rheinfelden (1308) by his nephew, John of Swabia, whom he had deprived of his hereditary possessions. Of his five sons, Frederic was chosen (1314) by a party to the imperial throne, but was defeated (1322) by his rival, Ludwig of Bavaria. Duke Leopold was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons that had thrown off their allegiance to Albrecht I. At last, by the death of all his brothers, Albrecht II. reunited the Austrian possessions, increased by various additions. After his death (1358), two sons, Rudolf and Albrecht III., successively followed in the duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach, in seeking to regain the Hapsburg possessions in Switzerland. The posterity of Albert and Leopold formed the two lines of A. and Styria. During Albrecht III.'s reign, Tyrol and other districts were ceded to Austria. After his death (1395), the dukedom was held by his son, Albrecht IV. Albrecht V., who succeeded his father, 1404, by marrying the daughter of the Emperor Sigismund, succeeded (1438) to the thrones of Hungary and Bohemia, and was at the same time raised to the dignity of German Emperor, as Albrecht II. With his death, in 1439, Bohemia and Hun-

gary were for a time lost to the house of A., as were also, after a bloody struggle, the last of the family possessions in Switzerland. But the imperial dignity was henceforth uninterruptedly held by them. With Ladislaw, Albrecht's son, the Austrian line of the House closed (1457), and their possessions went to the Styrian line. Of this line was the Emperor Frederic III., who raised the dignity of his house by making A. an archduchy. After the death of Ladislaw and of his own brother, Albrecht, Frederic came into the undivided possession of the archduchy (1464).

His son, Maximilian I., by marrying Maria, daughter of Charles the Bold, acquired (1477) the Netherlands. Becoming emperor on the death of his father (1493), he ceded the government of the Netherlands to his son Philip. Under Maximilian, Tyrol fell again to the chief branch of the House of A., several districts were acquired from Bavaria, and fresh claims were established on Hungary and Bohemia. The court of Vienna began to be the seat of German art and science. The marriage of the emperor's son Philip with Johanna of Spain set the House of Hapsburg on the throne of Spain and the Indies. Philip died 1506; and on the death of Maximilian I., 1519, Philip's son, Charles I. of Spain, was elected German emperor as Charles V. (q.v.). Charles resigned by treaty all the German possessions, except the Netherlands, to his brother, Ferdinand I. (q.v.).

Ferdinand I. had married the sister of Lewis II. of Hungary; and on the death of the latter in the battle of Mohacz (1526), he claimed the kingdoms of Hungary and Bohemia, with Moravia, Silesia, and Lausatia. His claim was contested by John Zapolya, who secured the aid of Sultan Soliman II.; and Ferdinand, after contests extending over 20 years, had finally to pay an annual tribute of 30,000 ducats to Soliman for possession of Lower Hungary. Ferdinand was fain also to surrender Würtemberg to Duke Ulrich (1534), on condition of its reverting to A. on the death of the male line. Nevertheless, the possessions of the House of A. (in the German line) were at this time already of the extent of 110,000 sq. m. On the abdication of Charles V. (1556), Ferdinand succeeded to the imperial dignity; he died 1564, with the reputation of a good ruler, though he was strongly conservative of everything established, and introduced the Jesuits.

In the partition of the inheritance among his three sons, the eldest, Maximilian II., received the imperial crown with A., Hungary, and Bohemia; the second, Ferdinand, Tyrol and Upper A.; the third, Karl, Styria, Carinthia, etc. Maximilian was more fortunate in Hungary than his father. The death of Soliman before Szigeth (1566) led to a truce; Maximilian procured that his eldest son Rudolf should be crowned king of Hungary 1572, and shortly afterwards of Bohemia, and chosen king of Rome. But his attempt to bring the crown of Poland into his house failed. Maximilian II. was fond of peace, tolerant in religion, and a just ruler. He died 1576; and of his five sons, the eldest, Rudolf II., became emperor. Under him, the possessions of the Archduke Ferdinand of Tyrol, who had married Philippine Welser

(q.v.), the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolf II. adhered to the old feudal usages, and was a negligent sovereign, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. At last he was compelled, 1608, to cede Hungary, and 1611, Bohemia and A., to his brother Matthias (q.v.). Matthias, who became emperor 1612, concluded a 20 years' peace with the Turks, and ceded (1617 and '18) Bohemia and Hungary to his cousin Ferdinand, son of the Archduke Karl of Styria, third son of Maximilian II. Matthias lived to see the outbreak of the Thirty Years' War (q.v.), and d. 1619, March 20.

Bohemia refused to acknowledge his successor, Ferdinand II. (q.v.), to whom all the Austrian possessions had reverted, and chose the elector palatine, Frederic V., the head of the Protestant union, as king. The States of A. and the Hungarians also were refractory. But the battle of Prague (1620) subjected Bohemia to Ferdinand; who formally set about rooting out Protestantism in that country and in Moravia, annulled their right of electing their king, and the patent of religious freedom granted them by Rudolf II., and set up a Rom. Cath. reformation tribunal which drove thousands into exile. The emperor also succeeded in extorting acknowledgment of his sovereignty from the States of A., among which Protestantism predominated; after which Protestantism was rigorously prohibited. Hungary also was at last compelled to yield, which had revolted under the Prince of Transylvania. But this religious war and persecution cost the House of A. the life-blood of its possessions. Of 732 cities in Bohemia, only 130 were left; of 30,700 villages, only 6,000; of 3 million inhabitants, only 780,000. Under Ferdinand's successor, the Emperor Ferdinand III. (1637–57), A. continued to be a theatre of war; and at the peace of Westphalia (1648) had to cede Alsace to France. Ferdinand III.'s son and successor, Leopold I., provoked the Hungarians to rebellion by his severity. Tekeli (q.v.) received aid from the Porte, and Kara Mustapha besieged Vienna (1683); which was rescued only by an army of Poles and Germans under John Sobieski hastening to its assistance. The emperor's generals now reduced the whole of Hungary, which was declared a hereditary kingdom in the male line (1687). Prince Eugene compelled the Porte (1699) to restore the country between the Danube and Theiss and, in 1718, to cede other important provinces to Hungary. The struggle between Leopold and Louis XIV. of France for the heirship to the king of Spain, led to the war of the Spanish Succession (q.v.), during which Leopold died, 1705, May 5. He was of sluggish, phlegmatic character, and wholly under the influence of the Jesuits.

His eldest son and successor, the enlightened Joseph I. (q.v.), continued the war. He died childless, 1711, Apr. 17., and was succeeded by his brother, Karl VI. The peace of Utrecht concluded under his reign (1713) secured to A. the

Netherlands, Milan, Mantua, Naples, and Sicily. The monarchy now embraced 190,000 sq. m., with 29 million inhabitants, and had a revenue of 14 million florins, with an army of 130,000 men. Its strength, however, was soon much exhausted by fresh wars with France and Spain. At the peace of Vienna (1737), Karl VI. had to give up Naples and Sicily to Don Carlos of Spain, and part of Milan to the king of Sardinia; receiving only Parma and Piacenza instead. He also lost at the peace of Belgrade (1739) nearly all the fruits of Eugene's conquests, giving back to the Porte, Belgrade, Servia, and the parts of Wallachia and Bosnia that had belonged to Austria. The emperor conceded all these points with the view of securing adhesion to the Pragmatic Sanction (q.v.), which conferred the succession on his daughter, Maria Theresa.

With his death (1740, Oct. 20) the male line of the Hapsburgs was extinct, and Maria Theresa, who was married to Franz Stephan, Duke of Lorraine, assumed the government. But counterclaims were raised on all sides, and a violent war arose, in which England alone sided with Maria. Frederic II. of Prussia conquered Silesia. The Elector of Bavaria took the title of Archduke of A., was crowned King of Bohemia at Linz and Prague, and elected emperor as Karl VII. (1742). The Hungarians alone stood by their heroic queen; who, at the peace of Breslau (1742), was forced to yield Silesia to Prussia. Frederic renewed the war by coming to the assistance of the emperor; but Karl dying (1745), Maria Theresa's husband was elected German emperor as Franz I. A second treaty of peace (1745) secured Silesia anew to Prussia; and at the peace of Aix-la-chapelle (1748), A. had to cede Parma, Piacenza, and Guastalla to Don Philip of Spain, and several districts of Milan to Sardinia. These sacrifices secured the existence of the Austrian monarchy; but Maria Theresa wished to recover Silesia, and with this view entered into alliance with France, Russia, Saxony, and Sweden; but after a bloody Seven Years' War (q.v.), Prussia retained Silesia, and A. had spent her blood and treasure in vain. At this time, paper-money first appeared in A., under the name of state-bonds. At Franz's death (1765), his son, Joseph II., became German emperor, and joint-regent with his mother of the hereditary states. Collateral branches of the house of A. were planted by the younger sons of Maria Theresa, the Archduke Leopold in Tuscany, and the Archduke Ferdinand, who married the heiress of Este. See MODENA. In the first partition of Poland (1772), A. acquired Galicia and Lodomeria, and the Bukowina was ceded by the Porte, 1777. At the death of the empress, 1780, the monarchy had an extent of 234,000 sq. m., with a pop. of 24 millions, and a debt of 160 million florins. The administration of Maria Theresa was distinguished by unwonted unity and vigor, both in home and in foreign relations.

Her successor, Joseph II., was an active reformer in the spirit of the enlightened despotism of the times, though often rash and violent in his mode of proceeding. He in-

troduced economy into every department, remodelled the censorship of the press, granted liberties and rights to Protestants, abolished 900 convents, and revised the school-system. His protective system of duties gave a start to native manufactures. But his reforming zeal and passion for uniformity excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the govt. by his brother, the Grand Duke of Tuscany—as German emperor, Leopold II.—who succeeded in pacifying the Netherlands and Hungary. Peace was concluded with Prussia and Turkey (1790). The fate of his sister, Marie Antoinette, and her husband, Louis XVI., led Leopold to an alliance with Prussia; but he died (1792, March 1) before the war with France broke out. The war was declared by France on his son Franz II., the same year. See FRANCE. By the treaty of Campo Formio (q.v.), 1797, A. lost Lombardy and the Netherlands, receiving in lieu the Venetian territory; two years later, at the second partition of Poland, it was augmented by West Galicia. Franz, in alliance with Russia, renewed the war with France, 1799, which was ended by the peace of Luneville. It is needless to follow all the alterations of boundary that the Austrian dominions underwent during these wars. The most serious was at the peace of Vienna (1809), which cost A. 42,000 sq. m. of territory, and 11 million florins of her revenue. It was in 1804, when Napoleon had been proclaimed Emperor of France, that Franz declared himself hereditary Emperor of Austria, uniting all his dominions in one empire. On the establishment of the Confederation of the Rhine, he laid down the dignity of German emperor, which his family had held for nearly five hundred years, and now took the title of Franz I., Emperor of Austria.

The humiliating peace of Vienna was followed (1809) by the marriage of Napoleon with the Archduchess Maria Louisa; and 1812, March, Napoleon and Franz entered into alliance against Russia. But when the Russian campaign of 1812 had broken the power of the French emperor, his father-in-law declared war on him (1813, Aug.), and joined the alliance of England, Russia, Prussia, and Sweden. The active part which the Emperor Franz now took in the downfall of Napoleon, his consenting to the banishment of his son-in-law to Elba, and the firmness with which he signed the declaration of outlawry against him on his return to France, and contributed to his final overthrow, thus deciding the fortunes of his own daughter and her son—all furnished grounds of claim to that full indemnity for her losses which A. obtained at the close of the war. In the remodelling of the map of Europe that took place at the Congress of Vienna (1815), 32,000 sq. m. were added to the 253,000 possessed by A. after the last partition of Poland, besides the advantages she gained in point of compactness, and facilities for trade, especially by the acquisition of Venice and Dalmatia. Ferdinand, the emperor's uncle, was also restored to the grand duchy

of Tuscany, of which he had been dispossessed by Napoleon.

After that time, A. exerted a powerful influence in European politics generally, and especially in the German Confederation; and that influence was uniformly hostile to constitutionalism. See METTERNICH. When the Polish revolution broke out, a strict neutrality was assumed; but a Polish corps that was driven into the Austrian territories was disarmed, and sent into Hungary, while a Russian division that had taken refuge on Austrian soil was let go, and equipped with the Polish weapons.

The death of Franz I. (1832, March 2) made little alteration in the policy of A.; Ferdinand I. trod in his father's footsteps. The political alliance with Russia and Prussia was drawn closer by a personal conference of the emperor with Nicolas I. and Frederic William III. at Teplitz, 1833, Oct. The calm was interrupted, 1840, by the war against Ibrahim Pacha in Syria, in which A. took part in union with England. An attempt at insurrection in Italy in 1844 was a complete failure.

But under this long-continued peace and superficial calm, the internal condition of the empire was coming to a crisis. The stifling bureaucratic system of government and police supervision had produced only irritation and discontent, and was powerless to compress the fermentation. The opposition in the several nationalities became stronger and stronger, and the tactics of playing these nationalities off against one another no longer succeeded. The Polish insurrection, which led to the incorporation of Cracow with the monarchy (1846, Nov.), had turned into a frightful rising of the peasantry in Galicia against the nobles. This enabled the government to overpower the political rising; but the success only increased the danger of the crisis, by encouraging it to proceed in the old reckless way. In the mean time the opposition to Austrian rule in Italy, Hungary, and Bohemia was becoming uncontrollable, and even the states of Lower Austria insisted on some control in the management of the state. The revolutionary movement was already in full swing in Italy, when the fall of Louis-Philippe (1848, Feb. 24) shook Europe to its foundations. A host of petitions and addresses was followed, March 13, by a popular movement in Vienna, to which the government and military, after a feeble resistance, succumbed. Metternich resigned, the arming of the citizens and freedom of the press were granted, and the emperor promised to convoke a consultative assembly from all parts of the empire. At the same time, the opposition in Hungary had carried their demand for an independent ministry responsible to the national diet, and the emperor was not in a position to withstand it. On March 22, the insurrection broke out at Milan, and Radetzky, the military commander, was forced to retire on Verona. Venice rose at the same time, and drove out the Austrians.

While the revolution was thus victorious in the provinces, the central authority was in a state of dissolution. The authority passed into the hands of the national guards

and the students' legion (the *Aula*). A rising of the people (May 15), in support of the Central Committee, formed from the national guards, which the government had attempted to dissolve, compelled its continuance, and also a revision of the electoral law, so as to convert the new diet into a constituent assembly. These proceedings led to the flight of the court to Innsbruck (May 17). An unsuccessful attempt of the govt. to break the power of the 'Aula,' resulted in the appointment of a Committee of Safety, to whose influence the govt. had to submit. A Slavic insurrection broke out in Prague after Easter, which was repressed with bloody severity by Prince Windischgrätz. While the emperor was thus lingering at Innsbruck, leaving Vienna in the power of the populace, and the Hungarians were pursuing an independent course, it was in Italy that the power of A. began to recover itself.

Radetzky had at first been reduced to the maintaining of a defensive position at Verona, against Charles Albert of Sardinia, who had declared war on A. at the outbreak of the revolution, and the forces that came to his aid from Tuscany, Rome, and Naples; and the foreign policy of A. was in such a state of discouragement, that negotiations were entered into under the mediation of Great Britain, offering the Lombards independence on moderate conditions. But in June, Radetzky took up the offensive, reduced in succession Vicenza, Padua, and other cities, and then turning against the chief Sardinian force, defeated it at Custozza (July 25), and drove it from the field. The fruits of the victory were the dissolution of Charles Albert's army, and a truce which again delivered Lombardy to Austria.

In the mean time, the govt. at Vienna was more powerless than ever. The emperor remained at Innsbruck, and the constituent diet was opened, July 22, by the Archduke John, as his representative. But a new crisis was ripening in Hungary. The Croats, under their Ban, Jellachich (q.v.), opposed the predominance of the Magyars, and refused obedience to the Hungarian government, which, under the Batthyanyi-Kossuth ministry, was pursuing a policy almost independent of Austria. Jellachich's resistance was officially condemned by the emperor, and he was threatened with deposition; but, as subsequently appeared, his conduct was secretly approved by the court. The archduke palatine, Stephen, now left Hungary, after a last attempt at conciliation; and the emperor, who had returned to Vienna after repeated invitations, named Count Lamberg commissioner, with the supreme command in Hungary. Lamberg, however, was murdered on the bridge of Pesth (Sept. 28). The Hungarian parliament was now dissolved, and the command given to Jellachich. But the parliament continued its sittings, and appointed Kossuth president of the committee of defense. When the imperial troops now began to march against Hungary, a frightful insurrection broke out in Vienna (Oct. 6), which was attributed to Hungarian instigation. The arsenal was stormed, and the war-minister, Latour, mur-

dered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organized, and the Polish general, Bem, put at the head of military affairs; while the diet wavered between loyalty and revolution. In the mean time, the military forces had withdrawn, and joined Jellachich, in order to prevent the Hungarians coming to the aid of the Viennese. Windischgrätz now approached with an army, and declared Vienna in a state of siege. The attack began Oct. 23, and after a resistance of eight days, Vienna surrendered.

Severe measures were then taken; and a number of leaders, among others Robert Blum (q.v.), were condemned and shot. The diet now met at Kremsir, and a new ministry was formed, into which Prince Schwarzenberg, Count Stadion, Bach, Bruck, and others entered. But the vigorous policy thought to be necessary for the restoration, and advocated by the archduchess Sophia, was not responded to by the easy nature of Ferdinand I. Accordingly, the emperor abdicated Dec. 2, as did also the archduke Franz Karl, and the latter's son, Franz Joseph (q.v.), was declared emperor.

In winter, Windischgrätz entered Hungary, and began the Hungarian war. After the encounters at Raab and Babolna, Ofen was besieged (1849, Jan.), and the Hungarians retired beyond the Theiss, and had time to organize themselves under such able leaders as Görgei and Klapka, and to prepare for the struggle of the following summer.

In the mean time, important events took place elsewhere. Radetzky made his rapid and decisive campaign (March 21–23), which by the victory of Novara led to the abdication of Charles Albert, and an indemnification for war expenses from Sardinia of 15 million lire. With the surrender of Venice, which took place in Aug., the subjugation of Italy was complete.

At Kremsir, the diet, proving intractable, was dissolved, 1849, March 4, and a constitution was granted (*octroyirt*), with two elective chambers, responsible ministers, and other constitutional provisions. In the national assembly at Frankfurt, A. opposed the project of a confederated state under the leadership of Prussia, and managed to thwart the conferring of the empire of Germany on the Prussian king (1849, March).

In Hungary, the Magyars, though the Germans and Slaves within the country itself were hostile to them, began the campaign with decided success. Bem conquered Transylvania in spite of Russian aid; and the rest of the Hungarian army advancing westward in spring, were successful against the imperial forces at Szolnok and Waitzen. Windischgrätz was replaced in the command by Welden, but the imperial cause was not improved. Kossuth's hopes rising, he proclaimed the deposition of the House of Hapsburg, and virtually made Hungary a republic. By May, Pesth and Ofen were again in the hands of the Magyars; and although General Welden was recalled, and the command given to Haynau, there was little

prospect of success against the Magyars, if a treaty with the czar had not brought the aid of a Russian army under Paskewitsch. The Austrians still suffered several reverses, and the Hungarians performed splendid feats of arms, such as Görgei's victory at Waitzen, and Klapka's sally from Komorn; but from June, the war on the whole began to be more favorable to A., whose forces were well managed by Haynau and Jellachich; and the intervention of the Russians brought an irresistible weight of numbers against the Magyars. After the affairs of Szegedin and Debreczin, Haynau's engagements on the Theiss, and the raising of the siege of Temeswar, it was in vain that Kossuth transferred the dictatorship to Görgei. Görgei, whether from treachery, as the other Magyar leaders maintained, or from necessity, as he himself avers, laid down his arms to the Russians at Vilagos (Aug. 13). The surrender of Komorn, in Sep., completed the subjugation of Hungary, which was treated as a conquered country, and the officers taken in Arad were dealt with by Haynau with a bloodthirsty rigor.

A. was now free to attend to politics, internal and external, and the spirit of the restoration soon showed itself. One important fruit of the revolution was retained—the liberation of the soil from the burdens and trammels of feudalism. All other liberal concessions very soon disappeared. For a time, the forms of the constitution of 1849, March, were retained; but the rigorous military government and the surveillance exercised over the press showed the tendency of things. The fundamental principles of the constitution turned out to the profit only of the Rom. Cath. Church, which freed itself from the *placetum regium*. In the beginning of 1851, Schmerling and Bruck, the liberal element of the ministry, retired; and in Aug., appeared a number of imperial decrees rendering the ministers accountable to the emperor alone. At last, 1852, Jan. 1, it was announced that the constitution and the fundamental rights were abolished, trial by jury set aside, the old press law revived, etc. This was followed by still greater concessions of influence to the clergy. The emperor did not conceal his predilection for absolute military government. All this was effected not without manifestations of discontent. The fires of revolution were still smouldering in Hungary and Italy; and in Lombardy, though still under strict military law, a tumult broke out, 1853, Feb., in which a number of officers and soldiers were stabbed. The finances, too, notwithstanding vigorous measures for improving the material resources of the country, continued in a bad state, so that incessant loans were required to cover the current deficit.

On the confused arena of German politics, the struggle for ascendency was kept up between A. and Prussia. In 1850, Oct., the two powers were armed and ready to come to blows; but the bold and determined policy of Schwartzenberg prevailed, and Prussia gave way. The points in dispute it might be difficult for any but a German to understand, even if they were worth the attempt. See GER-

MANY: HESSE-CASSEL. The result was that Prussia's scheme of a union was given up, and also A.'s admission with all her territories into the German Confederation; and in 1851, the old diet was restored. After the death of Schwartzenberg the foreign policy of A. was more conciliatory, and her interference in German affairs less dictatorial. Prussia and A., after 1852, Dec., were more friendly, on the whole, though the war in Italy gave rise to considerable ill-feeling between the two powers. In 1853, Feb., a commercial treaty was concluded, which was of the utmost consequence to the prosperity of A., as removing a great part of the obstructions to her commerce with the rest of Germany.

In 1853, a difference took place between A. and Turkey, a prelude to the war in the Crimea. In the quarrel between the Montenegrines and the Porte, A. took the part of the Montenegrines; she had also complaints as to the infringement of rights possessed by her on the Adriatic coast, and regarding the treatment of Christians in Turkey. The threatening mission of Count Leiningen, 1853, Feb., procured redress of these grievances. As if following up this movement, Russia came forward as the special protector of the Greek Christians of the Ottoman empire, and made demands on the Porte which were held inconsistent with the sultan's sovereign rights. It was the interest of A., as well as of the rest of Europe, to maintain the integrity of the Ottoman empire; but although she united with England and France in endeavoring to settle the question by negotiation, when the war broke out her peculiar relations to Russia led her to remain neutral.

The conduct of A. in Italy, especially after 1849, was such as to make that country a 'standing menace to Europe.' The government of A. in that portion of Italy of which she obtained possession by the treaty of 1815, was far from satisfactory; but what was chiefly complained of by the other powers was her interference in the affairs of the independent states of the peninsula. By means of secret treaties (copies of which were laid before the British houses of parliament, 1859), A. obtained a most undue influence in Parma, Tuscany, Modena, the States of the Church, and in the kingdom of the Two Sicilies. That influence was of course exercised in the interests of despotism, and in opposition to the welfare of the people, whose wishes their rulers, backed by Austrian troops, were enabled to set at defiance. The position of A. in Italy was canvassed at the meetings which followed the signing of the treaty of peace at Paris, 1856, but nothing resulted from the discussions. Sardinia seeing herself gradually environed by, and afraid to fall a victim to, the prevailing Austrianism, after all remonstrances of a peaceful kind had failed, began to, arm. A. demanded her immediate disarmament, on pain of war; but Sardinia, whose army was swelled with volunteers from every part of the peninsula, and having previously entered into a treaty, offensive and defensive, with France, refused. A. accordingly commenced hostilities by crossing the Ticino, 1859, Apr. 29.

On May 3, France, as the ally of Sardinia, formally declared war against A.; but in anticipation of what was to follow, she had several days before despatched troops into Piedmont. The Austrian troops were beaten in every engagement that followed, and so effectually, that on July 6, the emperor, who latterly had taken the chief command of his army, was fain to conclude an armistice with the Emperor Napoleon, who also commanded in person. On the 12th of the same month, the two potentates met at Villafranca, and agreed to terms of peace, the chief conditions of which were to be the cession of Lombardy to Sardinia. See ITALY. In 1866, a short and bloody war occurred between A. on the one hand, and Italy and Prussia on the other (see GERMANY), issuing in the cession of Venice to Italy, and the dual reorganization of the empire as described above. Since then, the Slavonic Bohemians have continued to struggle in vain for the separate crown rights of their ancient kingdom. The part taken by the govt. in the Russo-Turkish war of 1877–8, which led to the occupation of Bosnia and Herzegovina, provoked bitter feeling in Hungary. A secret alliance with Germany against Russia was published 1888.

AUSTRIAN, a. *aws'trĭ-ăn:* of or from Austria.

AUTARCHY, n. *aw'târ-kĭ* [Gr. *autarchia*, absolute power —from *autos*, self; *archo*, to rule]: government by a single person; absolutism.

AUTERFOIS, adv. *aw'tėr-fwaw* [Norm. Fr. *auter; fois*, time: Fr. *autrefois*]: before; previously; in *law*, used especially in the phrases A. *acquit*, previously acquitted; A. *convict*, previously convicted, and A. *attaint*, previously attainted. Any one of these three pleas, if substantiated, will prevent an indictment from being proceeded with, on the ground that one should not be tried twice for the same offense.

AUTEUIL, *ō-tėl':* formerly a country village at the entrance of the Bois de Boulogne, now inclosed within the fortifications of Paris. It is known as the residence of famous literary men—such as Boileau and Molière.

AUTHENTIC, a. *aw-thĕn'tĭk*, or AUTHEN'TICAL, a. *-tĭ-kăl* [F. *authentique*, authentic—from L. *authen'tĭcus*, original: Gr. *authen'tēs*, the real author of any act—from *autonentos*, that sets himself about his own business—*lit.*, trustworthy as coming from the author]: not false; being what it professes to be; not a fiction; genuine. It is frequently employed as synonymous with *genuine*, though a distinction has been drawn, especially by biblical critics, between the two words. *Authenticity*, it is said, refers to the statements made by an author; *genuineness*, to the authorship itself. Thus, we speak of a *History of England* as A., when the narrative is admitted to be correct; and we say of such and such a gospel or epistle that it is *genuine*, when we are convinced that it is the composition of the writer to whom it is attributed. See Watson's *Apology for the Bible*, and Trench's *Study of Words*. But some

authors use the words in the converse way. AUTHEN'TICALLY, ad. *-tĭ-kăl-ĭ*, or AUTHEN'TICLY, ad. *-tĭk-lĭ*. AUTHENTICATE, v. *aw-thĕn'tĭ-kāt*, to establish by proving the author; to prove to be genuine or true. AUTHEN'TICA'TING, imp. AUTHEN'TICA'TED, pp. AUTHEN'TICA'TION, n. *-kā'shŭn*, the act of proving by authority. AU'THENTIC'ITY, n. *-tĭs'ĭ-tĭ*, correctness as to facts or authority; the not being false; reality; truth.

AUTHENTICS, n. pl. *aw-thĕn'tiks* [F. *authentiques*]: an anonymous but valuable collection of the Novels or New Constitutions of Justinian.

AUTHOR, n. *aw'thėr* [Fr. *auteur*—from L. *autōrem* or *auctōrem*, an author, an originator—from *augĕō*, I increase or make to grow: OE. *auctour*]: one who creates or produces; a writer of a book, a poem, or an article. AUTHORESS, n. fem. AUTHORITY, n. *aw-thŏr'-ĭ-tĭ*, legal power; the legal right to exercise power of any kind; rule; influence; credit. AUTHOR'ITIES, n. plu. *-tĭz*, persons in power; original and contemporary books quoted. AUTHORITATIVE, a. *aw-thor'ĭ-tā'tĭv*, having an air of authority; positive; peremptory. AUTHOR'ITA'TIVELY, ad. *-lĭ*. AUTHOR'ITA'TIVENESS, n. the quality of being authoritative. AUTHOR'IZE, v. *aw'thor-īz*, to empower; to make legal; to justify. AU'THORI'ZING, imp. AU'THORIZED, pp. *-rīzd*. AU'THORIZA'TION, n. *-zā'shŭn*, the act of empowering or giving authority to. AUTHO'RIAL or AUTORIAL, a. pertaining to an author. AU'THORLESS, a. AU'THORLY, ad. like an author. AU'THORSHIP, n. the condition or state of being an author.—SYN. of 'author': writer; scribe; beginner; former; creator; originator; cause; composer;—of 'authoritative'; imperative; imperious; commanding; determinative; positive; dictatorial; peremptory;—of 'authority': jurisdiction; dominion; government; testimony; witness; precedent; credibility; influence; rule; credit;—of 'authorize': to commission; empower; warrant; justify.

AUTHOTYPE, n. *aw-thŏ-tīp'* [Eng. *autho(r)?; type*—from Gr. *tupos*, a blow]: a type or block containing the facsimile of an autograph, for use on a franked letter, a package of goods, or anything similar.

AU'TO: the Greek pronoun *self;* entering into many compound scientific terms of Greek extraction. In some compounds it denotes the agent or subject, as in *autocrat, automaton, autonomy;* in others, the object, as in *autobiography, autocratic, autodidactic;* in others, again, a mere reference to the subject, as in *autochthonous.* This variation in the grammatical relation of A. sometimes occasions ambiguity in the meaning of the compound.

AUTOBIOGRAPHY, n. *aw'tō-bī-ŏg'ră-fĭ* [Gr. *autos*, himself; *bios*, life; *grapho*, I write]: a life written by the individual himself. AU'TOBI'OGRAPH'IC, *-ĭk*, or AU'TOBI'OGRAPH'ICAL, a. *-ĭ-kăl*, pertaining to. AU'TOBI'OGRAPH'ICALLY, ad. *-lĭ*. AUTOBIOG'RAPHER, n. *-fėr*, one who writes his own life.

AUTOCHRONOGRAPH, n. *aw-tŏ-krŏn'ŏ-grăf* [Gr. *autos*,

self; *chronos*, time; *graphē*, that which is delineated, painted, or written]: an instrument that of itself records the time or duration of an event.

AUTOCHTHON, n. *aw-tŏk′thŏn* [Gr. *autoch′thŏn*, from the soil itself—from *autos*, self; *chthōn*, earth, land]: one supposed to spring from the soil he inhabits; an aboriginal; that which had its origin in a country. AUTOCH′THONAL, a. *-thŏn-ăl*, or AUTOCH′THONOUS, a. *-thŏn-ŭs*, indigenous; aboriginal.

AUTOCRACY, n. *aw-tŏk′ră-sĭ* [F. *autocrate*, an autocrat—from Gr. *autŏkratēs*, having power of himself—from Gr. *autos*, self; *krătos*, power—*lit.*, self-derived power]: government residing in a single person; supremacy; uncontrolled authority; government in which the sovereign unites in himself the legislative and the executive powers of the state, and thus rules uncontrolled. Nearly all eastern governments are of this form. Among European rulers, the emperor of Russia alone bears the title of Autocrat, thus signifying his constitutional absoluteness.—Kant used the word A. in philosophy, to denote the mastery of the reason over the rebellious propensities—the self-government of the soul. AUTOCRAT, n. *aw′tō-krăt*, a sovereign exercising absolute power; a title applied to the emperors of Russia. AUTOC′RATRIX, n. fem. *-trĭks*, or AUTOC′RATRICE, n. fem. *Au′tocrat′ĭc*, a. *-ĭk*, pert. to; also *Au′tocrat′ical*, a. *-ĭ-kăl*, or AU′TOCRATOR′ICAL. AU′TOCRAT′ICALLY, ad. *-krăt′ĭ-kăl-ĭ*. AU′TOCRAT′ICALNESS, n. the quality of being an autocrat.

AUTO-DA-FE, n. *aw′tō-dă-fā′* [Port., an act of faith]: the solemn public act that from 1481 was performed in Spain and Portugal at the execution of heretics condemned to death by the Inquisition (q. v.). It was generally held on a Sunday between Whitsunday and Advent, very often on All-saints' Day. At dawn, the dismal tolling of the great bell of the high church gave the signal to begin the drama of the day; for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the 'holy' tribunal at these processions, and even grandese of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of the Inquisition; next followed the penitents on whom only penance had been laid; behind them, and separated by a great cross which was borne before, came those condemned to death—barefoot, clad in the sanbenito, and with a pointed cap on the head; then, effigies of the fugitives; and lastly, the bones of dead culprits, in black coffins painted with flames and hellish symbols. The frightful train was closed by the army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced. In the mean time, the accused stood before a crucifix with extinguished torches

in their hands. After the sentence had been read to them, an officer of the Inquisition gave each of the condemned a blow on the breast with his hand, as a sign that they were given over by that tribunal to the secular power; on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterward they were brought to the place of execution. If they yet, at the last, made profession of the Rom. Cath. faith, they were so far favored as to be first strangled; otherwise, they were burned alive, and with them the effigies and bones of the fugitive and dead culprits. As a rule, the king with his whole court had to exalt by his presence the solemnity of the horrid transaction. The most splendid Auto-da-fé took place at Madrid, under Charles II., 1680; the last was held as recently as toward the middle of last century.

AUTODYNAMIC, a. *aw-tō-dī-năm′ĭk* [Gr. *autos*, self; *dunamikos*, powerful—from *dunamis*, power, strength]: operating by its own power or force without extraneous aid.

AUTOGENEAL, a. *aw′tō-jē′nĭ-ăl*, or AUTOGENOUS, a. *aw-tŏj′ĕ-nŭs* [Gr. *autog′enēs*, self-created—from *autos*, self; *gennăō*, I produce or generate]: self-begotten or self-generating. AUTOGENOUSLY, ad. *aw-tŏj′ĕn-ŭs-lĭ*, spontaneously.

AUTOGRAPH, n. *aw′tō-grăf* [F. *autographe*—from Gr. *autos*, self; *graphē*, writing]: a person's own handwriting. AU′TOGRAPHIC, a. *-ĭk*, or AU′TOGRAPH′ICAL, a. *-ĭ-kăl*, pertaining to. AU′TOGRAPH′ICALLY, ad. *-lĭ*. AUTOGRAPHY, n. *aw-tŏg′ră-fĭ*, a process in lithographic printing, by which a writing or drawing is transferred from paper to stone; the original of a treatise.

AU′TOGRAPH: that which is written with the person's own hand, and not by an amanuensis. In relation to manuscripts, it is used in opposition to a *copy*. The collection of autographs has become an object of eager pursuit, and they form a branch of literary trade. Their value is determined by the interest felt in the writer, the scarcity of such relics of him, and the contents of the writing. Besides portraits of famous persons, it is sought to possess a specimen of their handwriting or at least their signature, as the peculiarity of the style—the physiognomy of the handwriting—theoretically adds to the knowledge of their personality. Lithography is particularly serviceable in this matter, not only by supplying fac-similes for biographical and historical works and for portraits, but also by multiplying impressions of collected autographs, such as have appeared in England by Smith, in Holland by Nathan, and in Germany by Dorow. But deserving mention before all others are the *Isographie des Hommes Célèbres* (3 vols. Par. 1828–30), to which a supplement appeared 1839; the collection of French autographs by Delpech (1832), and of German by Schlodtmann (3d ed. 1860). There have been works published containing the sign-manuals of distinguished musicians, of the great poets, etc. The autographs of most of the English sovereigns are in Nichol's *Autographs*.

AUTO-INTOXICATION: a poisoning of the body by its own products. In the complicated processes that make up the sum total of human metabolism many products are formed which if not modified in some manner would poison and kill the body. The simplest illustration of this is seen in the function of respiration, in which the carbon dioxide in the venous blood is oxidized in the lungs and thus eliminated. The urine contains a number of bodies which if prevented from leaving the body would cause its death. Thus auto-intoxication may result from the normal products elaborated in the body if these are not modified, or are prevented an outlet. But the problem of auto-intoxication is much more complicated in many of its manifestations. Sick-headache, gout, diabetes, many neuralgias, Addison's disease, myxedema, acromegaly and many other obscure diseased conditions are known to be due to some form of perversion of the normal processes of metabolism and are instanced as forms of auto-intoxication. The general organs of defense in the constant play of these factors may be divided into two general groups, (1) those that have the function of transforming by chemical means many of the poisonous products of the normal metabolism of the body, and (2) those organs that are chiefly concerned in the elimination of these products. To the first group belong the liver, the mucous membranes, the thyroid, lymphnodes, the adrenal glands, the blood cells, the blood serum and the lymph. In the second group are the kidneys, the lungs, the skin, and the intestines.

Classification.—Auto-intoxication may result (1) from the failure of functions of certain organs having a definite chemical function. Pancreatic diabetes, bronze diabetes, pernicious anæmia, myxedema, acromegaly, cachexia, strumipriva, Addison's disease, these all come in this class; (2) by a faulty metabolism whereby normal amounts of waste products are not thrown off. Gout, diabetes, oxaluria, are examples of this type; (3) through retention of the normal physiological products in the organs themselves. Carbon dioxid poisoning is a type; (4) by means of excessive production of physiological or pathological products. Diabetic coma, cystinuria, acetonuria, uremia are types of this form. Such a classification is necessarily very inadequate and will be found to be of service only as a general framework on which a more exact systematization of knowledge may take place. Consult: Herter, *Chemical Pathology* (1902); Vaughan and Novy, *Cellular-toxins* (1902). See ANIMAL ALKALOIDS; LEUCOMAINE; PTOMAINE; TOXOLOGY.

AUTOLYCUS, *aw-tŏl'ĭ-kŭs:* Greek astronomer and mathematician of Pitane in Æolia, about B.C. 330, wrote on the Revolving Sphere, and on the Rising and Setting of the Fixed Stars. Both works, printed in Dasypodius's *Propositiones Doctrinæ Sphericæ* (Strasb. 1572), contain, for the most part, only such propositions of spherical astronomy as can be solved by means of a globe.

AUTOMALITE, n. *aw-tŏm′ă-līt,* or AUTOM′OLITE, *-o-līt* [Gr. *automŏlos,* a deserter—alluding to oxide of zinc being present in a mineral not resembling an ore; *lithos,* a stone]: a mineral—a variety of Gahnite; zinc aluminate, of the Spinel group; colors brown, or green to black.

AUTOMATH, n. *aw′tō-măth* [Gr. *autos,* self; *man′thăno,* I learn]: one who is self-taught.

AUTOMATIC, a. *aw′tō-măt′ik,* having power of motion or operation within itself; operating without external aid; capable of continuing its work without assistance until the power is exhausted; requiring little attention, as a machine. Since 1880 there has been rapid development of A. machinery, especially in the United States.

Machine designers, in the endeavor to reduce labor, have perfected mechanisms for rendering machines competent to work continuously with little or no assistance from the attendants. One of the earliest A. devices was the mechanism by which a steam-engine operates its own valves. See LINK-MOTION. The steam hammer (q. v.) is one of the earlier machines that may be called A., since it delivers its blows continuously and regularly. The successful development of the modern automobile has been accomplished only by making the motors, carburetters, etc., largely A. The highest type of gasoline engine used, and also the best steam-engines and water-tube boilers on automobiles, operate with very little oversight. The most recent maker of spinning and weaving machinery are almost wholly A., one man being able to oversee several machines. In a steel mill the machinery is so systematized that a man sitting on an elevated platform called a pulpit, where he pulls levers, is able to direct most of the operations that formerly required many men and much labor. In bookbinding much hand work has been dispensed with by the gathering machine, that collects the folded sheets and automatically piles them in proper order for binding; and by the cover-making machine, called a book-case machine or casing-machine, that brings together the parts of a book, pastes them in the cloth and delivers the complete book-cover. Large book-printing presses are now operated automatically with paper-feeding machines that supply the sheets, so that the entire operation of printing proceeds sometimes for hours without any effort on the part of the attendant, who commonly has two machines under his care. The A. bolt-making machine requires only to be fed with bars of iron. It grips these, in some machines several at a time, pulling in a piece of the length to which it is set, holding this against a lathe-tool that turns out the round body for the bolt; then passing it on to the die that cuts the screw-thread, then to a mechanism that bevels the head, and finally cutting off and dropping the finished bolt; after which it pulls in another section of the bar, and continues to repeat the operation as long as there are bars to operate on. There are many A. lathes for turning regular as well as odd-shaped objects, or for turning several at a time. The

turret-lathe is made A. with magazine feed. This feed pushes in a series of small castings or the like, one at a time, and they are severally mounted and turned, all passing out of the machine. Type-casting machines have been rendered A. so that an attendant can oversee the work of two or more. A flame heats the type-metal in a pot, and it is regularly pumped into the mold, which opens to receive it, closes and is tightly clamped to make a good cast, then opened again to eject the type. One A. type-caster has a hundred type-moulds mounted on a wheel, and casts at the rate of 40,000 type an hour.

AUTOMATISM: philosophically the term refers to the doctrine that human actions are so closely conditioned by external forces as to be regarded as the issues of a mechanical automaton. The term is predominantly used in its psychological sense to refer to the aggregate of actions occurring without the full and conscious cooperation of the subject. Tricks of manner, such as frowning, hesitations in utterance, gestures, toying with key or pencil, may thus be described as habit automatisms. Yet again the subconscious performance of habitual actions—such as winding of one's watch—may be equally automatic. More abnormal automatisms involve direction of activities usually requiring complex coordinations. Such are sleep-walking, and sleep-talking, and in nervous diseases the performance by the patient of a series of actions in immediate response to an irresistible and often constantly recurring impulse, and with no subsequent knowledge thereof. See SUBCONSCIOUS.

AUTOMATOGRAPH: an instrument designed to record involuntary movements. One form of the apparatus consists of a glass plate rolling upon three balls, in turn placed upon a glass plate beneath. The hand resting lightly upon the upper plate imparts to it the slightest waverings which are conveyed by a recording point to a smoked surface. Such tracings indicate the fluctuations of steadiness and in addition may show the direction of the attention. If the subject be asked to think intently of the place of a hidden object, the record may show the direction of the object. When the record begins to indicate the nature (by outline drawing or written name) of the object, the process becomes a form of automatic writing. See AUTOMATISM.

AUTOM'ATON, n. *aw-tŏm'ă-tŏn* [Gr. *autom'aton*, self-moving—from *autos*, self; *māō*, I move]: a self-moving figure or machine propelled by internal clock-work. AUTOM'ATA, or AUTOM'ATONS, n. plu. AUTOMATIC, a. *aw'tō-măt'ĭk*, or AU'TOMAT'ICAL, a. *-ĭ-kăl*, or AUTOMATAL, a. *aw-tŏm'ă-tăl*, or AUTOM'ATOUS, a. *-tŭs*, having power of motion in itself; acting from concealed machinery; self-regulating.

AUTOM'ATON: term applied usually to machinery constructed so as to represent human or animal actions. Albertus Magnus and Roger Bacon, 13th c., are said—though doubtfully—to have made respectively a porter

to open the door and a speaking head. Other well-known A. were the flute player (1738), the flageolet-player (1741) and the mechanical duck, made by M. Vaucanson and exhibited in Paris; the likenesses of public characters produced by M. Droz, a Swiss; the talking machine exhibited by Mr. Faber in Edinburgh; the chess-player of Kempelen, which created a sensation by defeating many well-known chess-players but which later proved to be a steel skeleton containing a man; and the 'Zoe' and 'Psycho' of Mr. J. N. Moskelyn (1875).

AUTOMOBILE CARRIAGE: a carriage which contains, within itself, machinery capable of producing sufficient propulsive power to overcome the friction of its own weight and frieght, when travelling on ordinary roads. The popular opinion is that this combination of results has been accomplished entirely within the past 20 years; the real facts are that it has taken nearly a century and a half to develop the automobile. As early as 1769 Nicholas Joseph Cugnot, of France, constructed a three-wheeled artillery wagon, propelled by steam power generated within itself, and ran it on the ordinary roads. In 1788 King George III. of England granted a patent to Robert Fourness and James Ashworth for a similar invention. In 1802 Richard Trevithick built a three-wheeled steam road-carriage with spur-gear connection to the drive axle. The first 20 years of the 19th century was the golden age of steam coaches in England, where several lines of them ran, amongst which was Goldsworthy Gurney's and Walter Hancock's, who ran a regular service from 1828 to 1838 which, in outward appearance, were remarkably like the most modern automobile, and even had its wedge drive-wheel. The invention of Mr. James in 1829 was really the first practicable automobile, judged by modern standards, for it had four cylinders and separately acting axles, and some of them continued on the road as late as 1857. All of them were heavy, with crude workmanship, but their real drawback was the necessity of carrying coal and water out of all proportion to the power which it produced.

It was not until the refiner produced "gasoline" from the distillation of the so-called mineral oils of America that the coal fuel and water difficulty were both overcome, and it became possible to generate a sufficient surplus force to make the automobile effective. Gasoline is a liquid of great power in an exceedingly small compass, and it takes the place of both the coal and water of the early steam engine era. A small quantity of it is stored in a tank within the automobile, and an infinitesimal portion of it is drawn, automatically, in the form of spray, into a cavity, known as the carburetter, wherein it is mixed with pure air, and forms a highly explosive hydrocarbon gas. This gas is let into one or more cylinders where it is internally exploded by

an automatic electric spark. The expansion consequent upon the explosion drives the pistons up, the pistons moving back expel the products of the combustion, and the parts are again in position for repeating the process. The first to make practicable the internal explosive power of gasoline was Gotthier Daimler of France who, in 1885 invented the popper-valves, now in universal use, the hot tube ignition, and the principle of a cylinder stroke long in proportion to the total content.

In the developments which have since taken place Automobiles have divided into three grades: one group propelled by gasoline, internally exploded, in the manner already described; a Second propelled by steam, which is the product of heat applied to water by gasoline (instead of coal as in the old days); and a third whose motive power is electricity, stored in a battery charged from a current generated outside itself. No statistics are available as to the relative number of each of these three classes, but a fairly good idea of their proportional division may be gathered from the fact that at the two great annual shows held in New York City in 1906 January, there were exhibited 317 gasoline automobiles, as against 68 electrics (mainly heavy powerful for commercial haulage) and 14 steamers.

All three of the groups owe much of their success to the perfection of mechanism and inventions common to them all: such as ball-bearings to reduce friction in working parts; air filled india-rubber pneumatic tires, drive chains of great ingenuity and perfection, automatic oil lubricators, and brakes which have placed within the driver's power a capacity of control by hand and drum, which were unthought of in the early days. The extent of the use of the automobile for pleasure and for business, to which it is every day becoming more and more a valuable aid, is testified by the fact that the total number of motor vehicles of all classes produced in the U. S. in 1906 was about 32,000; the total number in circulation was estimated at about 80,000, including about 3,000 motor cycles; and the number of pleasure cars imported from Europe was nearly 1,000.

Motor bicycles and tricycles have not made the progress in America which they have in Europe, where they abound, 37,000 of them being licensed in G. Britain and 25,000 in France. Road conditions, of course, are to a great degree responsible for this, and in this regard it may be noted that the extended use of the automobile, in its various forms, has had a marked effect upon the question of the betterment of the public highways. Nearly every state is making efforts in this direction, the State of New York leading off with an appropriation of $50,000,000 for the purpose.

The speed which the automobile can attain is limited practically by the roads over which it travels: a fair

average of results at a recent contest on a flat circular track, was 100 miles, by a 22 h. p., in 2 h. 5 m. 37 3–5 s. Five miles by a 60 h.p. in 5 m. 49 4–5 s. and one mile in 56 2–5 s.

AUTONOMY, n. *aw-tŏn′ŏ-mi* [Gr. *auton′ŏmos*, living by one's own laws—from *autos*, self; *nŏmos*, a law]: the power or right of self-government, whether by a nation, or (under certain restrictions) within limited bodies of the same people, such as parishes and corporations; exercise of national laws and constitution. The term A. is used to designate the characteristic of the political condition of ancient Greece, where every city or town community claimed the right of independent sovereign action. Recently the word is more specifically used of territories or provinces, which, while subject in some matter to a higher sovereignty, are self-governing in other respects. AUTONOMOUS, a. *aw-tŏn′ŏ-mŭs*, under self-government.

AUTOPLASTY, n. *aw′to-plăs-tĭ* [Gr. *autos*, itself; *plasso*, I form]: the operation by which a part that has been torn away or destroyed is replaced by other parts of the same individual.

AUTOPSY, n. *aw-tŏp′sĭ*, or AUTOPSIA, n. *aw-tŏp′sĭ-ă* [Gr. *autopsiă*, seeing with one's own eyes—from *autos*, self; *opsis*, sight]: seeing a thing one's self; ocular observation; in *med.*, a post-mortem examination. AUTOPTICAL, a. *aw-tŏp′tĭ-kăl*, or AUTOP′SICAL, seeing with one's own eyes. AUTOP′TICALLY, ad. *-lĭ*.

AUTO-SUGGESTION: the process of bringing about in one's self the hypnotic or allied suggestive state. See SUGGESTION.

AUTOTYPE, n. *aw′tō-tīp* [Gr. *autos*, self; *tupos*, a type or figure]: a peculiar kind of photographic print; usually a picture or portrait. Gelatine, to which bichromate of potash has been added, is sensitive to light, like paper treated with certain salts of silver. Light renders the bichromated gelatine insoluble, so that by the use of an ordinary photographic negative, a picture can be produced on the gelatine by exposure to light, as in the ordinary photographic printing process. See PHOTOGRAPHY. The picture so obtained is developed by removing with hot water those portions of the gelatine which have not been acted upon. Two groups of processes are founded on this property of bichromated gelatine. In one, the gelatine is used for every copy of the picture; while in the other, it is only used to produce one picture, which is then made by various devices to serve as a printing matrix for throwing off, by mechanical means, many impressions. What is called carbon-printing comes into the first group, and an autotype is one kind of a carbon print. It is produced by simply mixing carbon or other pigment with bichromated gelatine, coating a sheet of paper with the mixture, and then exposing it to light under a negative as above described. When no pigment is used, the picture is merely in relief and depression, but

the addition of carbon gives it ordinary light and shade, so as to resemble a print in ink. There are some niceties in the manipulation not here detailed. In those processes where the gelatine picture serves only as a matrix, electrotypes, impressions in soft metal or other kind of reverses, are made, from which impressions can be taken mechanically, in any kind of printing-ink. Photo-galvanography and the Woodburytype belong to this group. AUTOTYPOGRAPHY, n. *aw′tō′-tī-pŏg′ră-fĭ* [Gr. *autos*, *tupos*, and *grapho*, I write]: the process of photographic printing as above.

AUTUMN, n. *aw′tŭm* [L. *autum′nus*, the autumn—from *auctus*, increased, abundant]: the third season of the year, popularly beginning in England with Aug., in the United States with Sep., but really about Sep. 21, the period when the sun commences to cross the equator in its journey to the Tropic of Capricorn. AUTUM′NAL, a. of or pertaining to autumn.

AUTUN, *ō-tŭn′* (*Bibracte*, *Augustodunum*): town in France, dept. of the Saône-et-Loire, in the Burgundian dist. of Autunois; on the river Arroux. It is the seat of a bishop, and has a fine cathedral. Cloth, carpets, leather, stockings, and paper are manufactured in the place.—The ancient Bibracte was the chief city of the Ædui, and had a much frequented Druid school; and later, under the Romans, when it got the name of Augustodunum, it was no less famous for its school of rhetoric. A. was pillaged by the Saracens 725, and nearly destroyed by the Normans 888. There remain many ruins of Roman temples, gates, triumphal arches, and other antiquities. At the Council of A. (1094), King Philip I. was excommunicated for divorcing his queen, Bertha. Pop. 15,000.

AUTUNITE, n. *aw-tŭn′īt* [named because found near *Autun*, France]: an orthorhombic mineral of a citron or sulphur yellow color. The hardness is 2 to 2.5; the sp. gr. 3.05 to 3.19; the lustre on one face pearly, on others adamantine. It is translucent and optically biaxial. Composition: phosphoric acid, 13.40 to 15.09; uranium trioxide 55.8 to 62.24; lime 5.01 to 6.51; water 16.00 to 22.8; sometimes a little iron. It occurs with albite in Conn. and Mass.; in gneiss near Philadelphia; in mica mines in S. C.; also in S. Dak. and Utah.

AUVERGNE, *ō-vairn′*: southern central dist. of France, before the revolution a separate province, composing almost exclusively the modern depts. of Cantal and Puy-de-Dôme. Between the Allier and the upper course of the Dordogne and the Lot, A. rises into a highland region, having Bourbonnais, Limousin, and Rouergue, as terraces of descent into the w. plains, while on the e. it joins the Cevennes and the s. highlands. Not only do the cone and dome-like shapes of the summits show a volcanic formation, but also the great masses of bassalt and trachyte that break through the crust

of granite and gneiss render it probable that here was a chief focus of plutonic action. Among the summits that have apparently been volcanoes, the most remarkable are Cantal (6,093 ft.), Mont-d'Or (6,188), Puy-de-Dôme (4,806), and Pariou; the latter, adjoining Puy-de-Dôme, is basin-shaped on the top, and one of the finest specimens of an ancient and extinct volcano: all are now covered with verdure. A. has naturally two divisions—Upper A., to the s., and Lower A., to the n.; in which last the valley of Limagne, on the left bank of the Allier, is distinguished for extraordinary fertility. The climate is colder in the mountainous districts than the southern position, with a less elevation, would lead us to expect, and is remarkable for furious winds and violent thunder-storms; but in the deep valleys the heat of summer is often oppressive. The lava-covered plateaus are desert, but the pulverized volcanic earths that cover the slopes and valleys form a rich and fruitful soil, as is shown by the crops of grain, garden produce, fine fruits, wine, abundance of chestnuts in the south, and of walnuts in the north, as well as by extensive thriving forests, with flax and hemp fields and meadow-lands, in the poorer districts. Agriculture is somewhat neglected; but the breeding of cattle, especially of mules, is well managed. A. produces iron, lead, copper, antimony, and coal, and is rich in mineral springs

The Auvergnese are a highland people, rude in their manners, poor, ignorant, yet honest and kind, though not free from the propensity to revenge. They live by cattle-keeping and agriculture, and many go to Paris as laborers. Domestic manufactures, therefore, remain confined to weaving, tanning, and paper-making. A. has, however, produced distinguished men. It was the native place of statesmen and warriors of the 15th and 16th c.; also of the Arnauld (q.v.) family, distinguished in the history of Port Royal and of Jansenism; also, in more recent times, Lafayette and Polignac. Chief towns, Clermont and Aurillac (q.v.). The country derived its name from the Arverni, who long defended their fastnesses against Cæsar, and later against the Goths, Burgundians, and Franks, with whom they at last coalesced.

AUVERNAS, n. *aw-vèr'nas* [F. *auvernas*, a name given at Orleans to certain kinds of black raisins]: a heady wine, made near Orleans from the raisins mentioned in the etymology. Kept two or three years, it becomes excellent.

AUXERRE, *ō-sār* (anc. *Autissiodurum*): chief town of the dept. of Yonne, France; on the Yonne, 90 m. s.e. of Paris; on the slope of a hill, in a rich and beautiful district abounding in vineyards. The city is mostly ill built; but its aspect from a distance is very imposing, the most prominent feature being the cathedral church of St. Stephen, which dates partly from the 13th c. The chapter of A. was once one of the richest in France. The churches of St. Germain and of St. Pierre (16th c.) are fine and interesting buildings. There is a curious old clock-tower over a gatehouse, with an ugly skeleton spire of iron bars. The ancient walls of the city have been converted into boulevards. A. was a flour-

ishing town before the Roman invasion of Gaul. It successfully resisted the Huns under Attila, who only ravaged its suburbs. Clovis took it from the Romans. After his death, it became part of the kingdom of Burgundy. The English took it 1359, but it was retaken by Du Guesclin. Charles VII. gave it up to the Duke of Burgundy. It was finally united to the kingdom of France by Louis XI. The principal manufactures are of strings for musical instruments, woolen cloths, hosiery, earthenware, and leather. Pop. 19,000.

AUXESIS, n. *awg-zē'sĭs* [Gr. *auxēsis*, increase]: in *rhet.*, a figure by which anything is magnified too much. AUXETIC, a. *-ĕt'ĭk*, pertaining to.

AUXILIARY, a. *awg-zĭl'ya-rĭ* [L. *auxĭlĭārĭŭs*, bringing aid—from *auxĭlĭŭm*, help—from *auxit*, it has increased]: helping; assisting: N. a helper; an assistant; applied to the verbs, shall, will, may, can, must, etc., as helping to form the tenses of other verbs, and thus performing the same office as inflections in L. or Gr. verbs. AUXIL'IARIES, n. plu. *-ya-rĭz*, foreign troops. AUXILIAR, a. *awg-zĭl'ĭ-ėr*, helping. AUXIL'IATORY, *-a to-rĭ*, assisting, helping.

AUXIL'IARY SCREW: see SCREW-PROPELLER.

AUXIL'IARY VERBS: see VERBS, CONJUGATION.

AUXONNE, *ō sōnn'* (*Assonium, Ad Sonam*, 'near the Saône'): French town, on the left bank of the Saône, 20 m. s.e. of Dijon; a fortress of the second class. Pop. 5,000.

AVA, *â'vâ:* ruined city of Burmah, of which it has repeatedly been the cap., the honor having been transferred again and again between it and Monchobo, Sagaing, Amarapura, and Mandalay, the present cap. It is in lat. 21° 51′ n., long. 95° 58′ e.; on the bank of the Irawaddy, here about 4,000 ft. broad. The river at this point receives two affluents; and these, joined by a canal, render the city circumnavigable. The name is a Hindu and Malay corruption of Aengwa or Aaen-ua, meaning *fish-pond*, given it from being built where there were formerly fish-ponds, of which some remain; but in official documents it is designated as Ratnapura, i. e., City of Pearls. The city, which was 8 or 10 m. in circumference, was surrounded by walls and ditches. A. is now almost a desert, having been reduced to ruins by an earthquake in 1839.—On the opposite bank stands Sagaing, which has twice been the seat of government. The united pop. of the three cities of Ava, Sagaing, and Amarapura was at one time est. 400,000.

AVA, *ā'va* or ARVA, or YAVA, or KAVA [native name *Kava*], (*Macropiper methysticum*): plant of the natural order *Piperaceæ* (q.v.), possessing narcotic properties. Until recently, it was ranked in the genus *Piper* (Pepper). It is a shrubby plant, with heart-shaped, acuminate leaves, and very short, solitary, axillary spikes of flowers. It is a native of many of the South-sea islands, where the inhabitants intoxicate themselves with a fermented liquor having the same name as the plant, prepared from its root or (more accurately) rhizome. The rhizome is thick, woody, rugged, and aromatic. A tincture of it is useful in chronic rheuma-

tisms. The intoxicating liquor is prepared by macerating it in water. The savage Tahitians were accustomed to prepare it in a very odious manner; much as the Indians of the Andes prepare *Chica* (q.v.) or Maize beer—chewing the root, depositing it in a bowl, straining through cocoa-nut husk, and mixing with water or cocoa-nut milk, after which fermentation speedily ensues. The taste is unpleasant to those unaccustomed to it, and has been likened to that of rhubarb and magnesia. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava causes a whitish scurf on the skin, which among the heathen Tahitians was reckoned a badge of nobility, the common people not having the means of indulgence requisite to produce it.—The leaf of the ava plant is in some places used with the betel-nut, instead of that of the betel-pepper.

AVADAVAT, n. *ăv'a-da-văt*, or AMADAVAT, n. *am-ăd'a-văt:* an East Indian bird, the *Estrelda amandava.* Male: bill carmine-colored; upper parts, brownish-gray before, red behind; lower, whitish, with dashes of red and black; wings dark, covered, as are the sides and posterior parts of the back, with white spots. The female is less highly colored.

AVAIL, v. *ă-vāl'* [L. *ad,* to; *valĕō,* I am strong: F. *à, valoir,* to be worth—*lăt.,* to be worth]: to turn to advantage; to be of use; to profit; to make use of: N. profit; advantage. AVAIL'ING, imp. AVAILED, pp. *ă-vāld'*. AVAILABLE, a. *ă-vāl'ă-bl,* profitable; that can be turned to advantage. AVAIL'ABLY, ad. *-blĭ.* AVAIL'ABIL'ITY, n. *-bĭl'ĭ-tĭ,* or AVAIL'ABLENESS, n. *-bl-nĕs,* the power of furthering an object in view.—SYN. of 'avail, n.'; use; benefit; utility; service; usefulness; profit.

AVALANCHE, n. *ă vă-lănsh'* [F. *avalanche* and *avalange*—from *a val,* downwards: L. *ad,* to; *vallem,* the valley]: a vast mass of snow or ice, sometimes with rocks, soil, and trees, sliding or rolling down the declivities of high mountains, often occasioning great devastation. Drift or powder avalanches (*Staub-lawinen*) consist of snow, which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent, and comes suddenly into the valley in an overwhelming dust-cloud. A. of this kind occur chiefly in winter, and are dangerous on account of their suddenness, suffocating men and animals, and overturning houses by the compression of the air which they cause. Another kind of A. resembles a land-slip. When the snow begins to melt in spring, the soil beneath becomes loose and slippery; and the snow slides down the declivity by its own weight, carrying with it soil, trees, and rocks. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring beginning to roll or slide on these slopes, is hurled over the precipices with fearful force into the valleys. The very wind caused by its swift descent prostrates forests and houses. Ice A. are those that are seen and heard, commonly in July, Aug., and Sep., thundering down the

steeps, e.g., of the Jungfrau. They consist of masses of ice that detach themselves from the glaciers in the upper regions.

AVALE, v. *ȧ-vāl'* [F. *avaler*, to descend as a river: F. *aval*, down stream—from L. *avalārĕ*, to sail down stream—from *ad*, to; *vallem*, a valley]: in *OE.*, to let fall; to depress; to descend; to come down.

AVAL ISLANDS: see BAHREIN ISLANDS.

AVALLON, *â-vâl-ōn'* (anc. *Aballo*): town of the dept. of Yonne, France, 26 m. s.e. of Auxerre; on a steep hill of red granite, nearly surrounded by the Cousin. A. is a very ancient town of Celtic origin, and has been often besieged and taken. Pop. 5,500.

AVANT-COURIER, n. *ă-vŏng'kôr'ĭ-ā* [F. *avant*, before, and *courier*]: a runner; a person sent beforehand to give notice of the approach of another. AVANT-GUARD, n. *-gärd*, the van; the first body of an army.

AVANTURINE, n., or AVENTURINE, n. *ă-văn'tū-rĭn* [F. *par aventure*, by accident]: a variety of quartz found in India, Spain, and Scotland, deriving its peculiar play of reflected light and colors from embedded spangles, or by minute particles of mica; a variety of felspar; an artificial mineral far exceeding the natural in brilliancy; a bright brown color.

AVA'RI: tribe of eastern origin, appearing 100 years later than the Bulgarians, in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained in the Caucasus, another part pressed forward (about A.D. 555) to the Danube, and settled in Dacia. Here they served in Justinian's army, and assisted the Lombards to overturn the kingdom of the Gepidæ; and, about the end of the 6th c., under the mighty Khan Bajan, they conquered Pannonia. Later, they made themselves masters of Dalmatia; made devastating incursions into Germany, as far as Thuringia; and into Italy, where they warred with the Franks and Lombards, and extended their dominion over the Slaves living on, and n. from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them, and in 640 drove them out of Dalmatia. Confined to Pannonia, they were subdued by Charlemagne, and well-nigh extirpated by the Moravians, so that, after 827, they disappeared from history. They usually surrounded their settlements with fortifications of stakes driven into the ground, and earth, of which traces, under the name of Avarian Rings, are yet found in the countries formerly occupied by them. The results of the most recent criticism show that, in all probability, the A. belonged to the same great Turanian stock as the Huns, and that their original residence was the land lying east of the Tobol, in Siberia.

AVARICE, n. *ăv ă-rĭs* [F. *avarice*—from L. *avārĭt'ĭă*, an eager desire—from *avārus*, greedy: It. *avarizia*]: an eager greediness of gain; an unbounded desire of getting and possessing wealth; greediness; covetousness. AVARICIOUS, a. *ăv'ă-rĭsh'ŭs*, greedy of gain; covetous. AV'ARI'CIOUSNESS,

n. *-ŭs-nĕs*, greediness of gain. AV'ARI'CIOUSLY, ad *-lĭ*.—SYN. of 'avaricious': niggardly; covetous; parsimonious; penurious; miserly; sordid.

AVAST, int. ad. *ă-vâst'* [perhaps It. *basta*, enough, cease: Dut. *houd vast*, hold fast]: a nautical term—hold; stop; stay: a command to cease from any operation—e.g., 'avast heaving.'

AVATAR, n. *ăv'ă-târ'* [Skr. *avatâra*, descent]: the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It resembles in signification the Christian term *Incarnation*. The word A. is sometimes rhetorically employed in English literature. The avatars of Vishnu (q.v.) are the most famous in Hindu mythology.

AVATCHA, *â-vâ'châ*: a mountain and bay of Kamtchatka. The bay is on the e. coast, being by far the best harbor of the peninsula, and containing the cap. city of Petropaulowsk (q.v.). The mountain, 9,055 ft. in height, is about 20 m. to the n., not far from the sea, lat. 52° 15′ n., long. 158° 50′ e. It is a volcano with two craters—one at the summit, and the other rather more than half-way up, on the seaward side.

AVAUNT, int. *ă-vawnt'* [F. *en avant*, forward! on!—from *avant*, before—from L. *ab*, *ante*, before]: begone; go forward.

AVE, n. *ā'vĕ* [L. *ăvē*, hail—from *ăvĕō*, I am happy or safe]: AVE MARIA, *ā'vĕ mărī'ă*, hail Mary—in Latin, the first two words of the angel Gabriel's salutation to the Virgin Mary (Lk. i. 28): 'Hail, Mary, highly favored, the Lord is with thee; blessed art thou among women, and blessed is the fruit of thy womb.' In this form, according to an ordinance of Gregory I., the invocation was at first said by the priests during mass, on the fourth Sunday after Advent. With the extended worship of the Virgin since the 11th c., the A. M. appears as a lay-prayer of nearly equal use with the *Pater Noster*, and was sanctioned as such at the end of the 12th c. Accordingly, not only did Urban IV. (1261) add the concluding words, *Jesus Christus, Amen*, but since the first half of the 16th c., the prayer began to receive, more and more commonly, as an addition to the old formula, what constitutes the conclusion of the modern form: 'Holy Mary, mother of God, pray for us sinners, now and at the hour of our death, Amen.' This prayer, known also as Angelica Salutatio (Angelic Salutation), is a very common form among Rom. Catholics. An edict of John XXII. (1326), ordains that every Rom. Catholic shall, morning, noon, and evening, at the warning of the bells, repeat three aves. This ringing of bells as a summons to morning, mid-day, and evening prayers, is retained in some Protestant countries, and is still called the Ave Maria, or Angelus Domini. The aves are reckoned by the small beads of the rosary, which are hence called Ave Marias, while the large beads are devoted to the Pater Noster. 150 Ave Marias form—after the 150 Psalms—a *Psalterium Mariæ*, and are thought to possess high propitiatory power.

AVEBURY, *ā'bĕr-ėh*, or A'BURY, or A'BIRY: village in Wiltshire, Eng., 6 m. w. of Marlborough, 25 m. n. of Salisbury; on Salisbury Plain, 16 m. from Stonehenge, whose reputation for Druidical remains it shares. Pop. 769.—A. is notable as the site of the largest Druidical ruin in Europe, besides numerous barrows and cromlechs. Here what is supposed to have been a temple, comprises a hundred large stone columns, placed in a circle about a space 470 yards in diameter, with two inner double or concentric circles, one containing 43 and the other 45 upright stones. These stone pillars, or columns, vary between 5 and 20 ft. in height, and 3 and 12 ft. in breadth.

AVELLA, *â-vĕl'lâ* (anc. *Abella*): town of central Italy province of Avellino; 20 m. e.n.e. of Naples. Pop. 4,000.

AVELLANEDA, NICHOLAS, Argentine statesman: b. Tucuman, 1836, Oct. 1; d. 1885, Dec. 26. He was professor of political economy in the University of Buenos Ayres; minister of public instruction in 1868–74, and president of the republic in 1874–1886. He published several historical and economical works.

AVELLANEDA y ARTEAGA, *a-vā'lya-nā'da ē âr'tā-â'ga*, GERTRUDIS GOMEZ DE, distinguished Spanish poet, dramatist and novelist; b. Puerto Principe, Cuba, 1814, March 23; d. Madrid 1873, Feb. 2. Under the pseudonym Peregrina she contributed to Andalusian journals many *Lyric Poems* (1851–54), and afterward wrote a series of spirited novels: *Two Women; The Baroness de Joux; Dolores*, and others. She gained still higher distinction with the tragedies *Alfonso Munio*, the hero of which was her own ancestor, and *The Prince of Vianna*. Her later compositions had a tone of melancholy; among these are Biblical dramas, as *Saul* and *Balthasar;* the spiritual song, *At the Cross*, and *The Last Ascent of My Harp* (1850). In the later years of her life she composed 16 plays which still have a place on the Spanish stage.

AVELLINO, *â-vĕl-lē'nō* (anc. *Abellinum*): chief town of the prov. of the same name in the s. of Italy; at the foot of Monte Vergine, on which is the famous monastery founded by S. Guglielmo da Vercelli, on the ruins of a temple of Cybele, 1119. A. suffered greatly from earthquakes in 1694, 1731, and 1805. It has manufactures of woolens, paper, macaroni, and considerable trade in corn and hazel-nuts The *nuces Avellanæ* were famous even in Pliny's time. Between A. and Benevento is the Val de Gargano, where the Samnites defeated the Romans A.U.C. 433. Pop. (1901) of town, 23,700; of province, 402,450.

AVE'NA: see OAT.

AVENACEOUS, a. *ăv'ĕ-nā'shŭs* [L. *ăvēna*, oats]: of or like oats. AVENAGE, n. *ăv'ĕ-nāj*, a stipulated quantity of oats paid as rent, or in lieu of other dues. AVENIN, n. *ăv'ĕ-nĭn*, the variety of vegetable casein obtained from oats; oat-legumin.

AVENARIUS, RICHARD HEINRICH LUDWIG: German

philosopher: b. Paris 1843, Nov. 19; d. 1896, Aug. 18. Shortly after his birth his parents moved back to Germany, first to Leipsic and later to Berlin. In obedience to his father's will, but against his own inclinations, he entered the bookseller's business. Later his own wishes prevailed. He returned to the gymnasium, graduated, and afterward studied literature and philosophy in Zurich, Berlin and Leipsic. The teachers that influenced him most were Ludwig, Drobisch, Zarncke and Wudtke. He obtained his doctorate in 1868, his thesis being entitled, *Über die beiden ersten Phasen des spinezischen Pantheismus.* The following years he spent partly in Berlin and Dresden and partly in Mediterranean countries, occupying himself further with scientific study and poetic composition.

In 1876 he habilitated as lecturer in Leipsic. The title of his dissertation was *Philosophie als Denken der Welt gemäss dem Prinzip des kleinsten Kraftmasses.* This contains the main thought that from this time on was to govern his research. In 1877 Avenarius founded the important philosophical periodical, *Vierteljahrsschrift für wissenschaftliche Philosophie.* In the same year he was called to the chair of philosophy in Zurich to succeed Windelband. In 1888–90 appeared the two volumes of his chief work, *Kritik der reinen Erfahrung* and in 1891 his *Der menschliche Weltbegriff.* Unfortunately the new and difficult terminology of his books hindered seriously their being studied and thus prevented their being subjected to discussion before the death of their author.

The chief endeavor of Avenarius was to restate our conception of the world and to do this as far as possible free from all the theories and dogmas we inherit from centuries of scientific and philosophical study. The following sentence formulates a chief conclusion: 'Sensation, which is all that is left as objectively given after the removal of the subjective additions, constitutes the content, and motion the form of the existent.' He called his philosophical theory Empirio-criticism.

AVENGE, v. *ă-vĕnj'* [OF. *avengier;* F. *venger,* to revenge —from L. *vindĭcārĕ,* to avenge]: to take satisfaction for an injury by justly punishing in some way the person that injures. To REVENGE, is to punish for a real or supposed injury in a malicious or arbitrary manner. AVEN'GING, imp. AVENGED, pp. *ă-vĕnjd'.* AVEN'GER, n. one who. AVENGE'MENT, n. punishment for injury.

AVENGER OF BLOOD: see BLOOD, AVENGER OF.

AVENS, n. *ăv'ĕnz* [W. *afans*]: a common wild plant with small yellow flowers; the *Gĕŭm urbānum,* ord. *Rosācĕæ;* the herb bennet. See GEUM.

AVENTINE, a. *av'ĕn-tīn* [L. *Aventinus*]: pertaining to the Mons Aventinus, one of the seven hills on which Rome was built: N. a military refuge; a tower; a defensive fort.

AVENTURINE,: see AVANTURINE.

AVENUE, n. *ăv'ĕ-nū* [F. *avenue*—from L. *ad,* to; *venĭō,*

I come]: a passage; a road to; an entrance into; a walk shaded by trees; in *Amer.*, a wide street.

AVER, v. *ă-vėr'* [F. *avérer*, to maintain as true—from mid. L. *advērārĕ*, to declare a thing true—from L. *ad*, to; *vērus*, true]: to maintain a thing as true; to declare positively; to assert. AVER'RING, imp. AVERRED, pp. *ă-vėrd'*. AVER'MENT, n. a positive declaration or assertion.—SYN. of 'aver': to assert; affirm; asseverate; protest; declare; avouch.

AVERAGE, n. *ăv'ėr-āj* [Ger. *haferei;* F. *avarie* or *avaris;* Sp. It. *avaria*—from mid. L. *havārĭă*, sea-damage to cargo in transit: Ar. *âwar*, a defect or flaw, damage to merchandise]: formerly applied to the money paid by those who received their goods in safety to indemnify the others whose goods had been thrown overboard in a storm; calculation and distribution of the loss arising from goods thrown overboard; a mean proportion; the mean of any collection of sums, numbers, or quantities, found by dividing the totals by the number of the sums or quantities: ADJ. being in a condition common to many—as a man of *average height*, an *average crop:* V. to make equal to others; to reduce to a level; to proportion. AV'ERAGING, imp. AVERAGED, pp. *ăv'ėr-ājd*. AVERAGELY, ad. *-lĭ*, according to an average. *Note.*—Skeat says *average* was anciently a proportionate contribution rendered by a tenant to the lord of the manor in lieu of the service of carrying wheat, turf, etc.; mid. L. *averāgĭum*, the service due to their lords—from *avērĭa*, cattle; the average was estimated according to the work done by the *avers* or cart-horses; then it was extended to carriage of goods by ships: *average* is not in early use in literature.

AVERAGE, *ăv'ėr-rāj:* a mean proportion, or intermediate sum. If any number of unequal quantities are given, another quantity may be found of a mean or intermediate magnitude, some of the given quantities being greater, and others less, than the one found, which is called the A. The exact relation is this: that the sum of the excesses of the greater above the A. is equal to the sum of the defects of the less below it. If there are, say, 7 vessels unequally filled with sand, and if we take handfuls from the greater, and add these to the less, until the sand is equally distributed, then any one of the equalized measures of sand is the A. of the 7 unequal measures. If the quantities of sand in the several vessels are stated in numbers, as 5, 10, 12, 8, 11, 14, 3 ounces, the A. is found by adding together the numbers, and dividing by how many there are of them—viz., by 7. The sum being 63, this, divided by 7, gives 9 ounces as the average. The system of averaging is a very important and time-saving one. By averages, the farmer calculates the value of his crops; the grazier, the value of his cattle; and the forester, the value of his trees. Reflection, however, requires to be exercised in striking averages; otherwise, serious errors may be committed. If a farmer, for instance, has three lots of sheep, the first of which he averages at $25 a head, the sec-

ond at $15, and the third at $9, it might be thought that the A. of the whole stock made up of the three lots would be got by taking the mean of $25, $15, and $9—viz., $\frac{25+15+9}{3} = \$16\frac{1}{3}$. But this would be correct only if there were an equal number of sheep in each of the lots. To get the real A. in case of the lots being unequal, he must multiply the A. of each lot by the number of sheep in it, add the three products together, and divide by the whole number of cattle in all three lots taken together. If we suppose 9 head in the first lot, 20 in the second, and 15 in the third, the A. is $\frac{25\times9+15\times20+9\times15}{9+20+15} = \$15$.

AVERAGE, in Marit. Law: proportionate distribution of losses. A rule was established by the Rhodian law (q. v.), and has prevailed in every maritime nation, that where a loss has been sustained, or expense incurred, for the general safety of the ship and cargo, a contribution should be made, in proportion to their respective interests, by the owners of the ship, freight, and goods on board; or, in modern times, by the insurers of these. To this contribution the name of *General A.* is given. The apparel, jewels, and other personal property of the passengers, not carried for purposes of traffic, and the seamen's wages and provisions, are not liable for any share in this contribution. Goods thrown overboard are now estimated at the price they would have yielded at the port of delivery at the time, freight, duties, etc., being deducted. See JETTISON. *Particular A.* is the loss of an anchor, the starting of a plank, the leaking of a cask, the loss of goods washed from the deck, or the like, where the common safety was not in question, and where there is, consequently, no contribution. To losses of this description, the term A. is generally, though incorrectly, applied. *Petty averages* are the duties of anchorage, pilotage, etc. If these occur in the ordinary course of the voyage, they are not loss, but simply part of the expense necessarily incurred. But if they have been incurred in extraordinary circumstances, and for the purpose of avoiding impending danger, they are a loss included in the general A., and covered by the contribution. *A. Bond* is a deed which parties liable to a general A. are in the habit of executing, by which they empower an arbiter to value the property lost, and fix the proportion to be borne by each. See ADJUSTMENT in Law.

AVER-CORN, n. *ăv-ėr-kōrn* [so called, according to Skinner, because it is the corn drawn to the granary of the lord of the manor by the working cattle, or *avers*, of the tenants]: a reserved rent in corn, paid by farmers and tenants to religious houses. AVER-LAND, n. land plowed by the tenants, with their cattle, or *avers*, for the use of a monastery or of the lord of the soil. AVER-PENNY, n. money formerly paid in lieu of arrage and carriage. AVER-SILVER, n. a custom or rent so called, originating from the cattle, or *avers*, of the tenants of the soil.

AVER'DANT, a. [Eng. *a; verdant*]: in *her.*, covered with green herbage.

AVERELL, *ā' vĕr-el*, WILLIAM WOODS: military officer; b. Cameron, Steuben co., N. Y., 1822, Nov. 5; grandson of Ebenezer A., capt. under Gen. Sullivan in the revolutionary army. Young A. graduated at West Point 1855, June, and until 1861 he was on garrison and frontier duty. He was promoted to first lieut. mounted riflemen 1861, May 14, was in the battle of Bull Run, and served on staff duty about Washington until Aug. 23, when he was appointed col. 3d Penn. cav. He was in the campaigns of the Army of the Potomac during the next two years, but began to gain a special reputation as a daring and able cavalry officer, by his cavalry raids 1863, Mar., in W. Va. Through all that summer he was hunting the Confederates through the country of the Upper Rappahannock, and in Nov. and Dec. with an army of 5,000 men drove them into s.w. Va., cut the Virginia and Tennessee railroad, and destroyed large quantities of supplies. Notwithstanding all the efforts of the Confederates to cut off his retreat from their country, A. succeeded in getting his force through with 200 prisoners and 150 horses. After a brief period of sick leave, he was placed in command of the 2d cav. division, and through 1864 and till 1865, May 18, when he resigned, he was continuously engaged in sharp cavalry raids in the Shenandoah Valley and that vicinity. A. reached the rank of brevet maj.gen. For three years after the war, he was U. S. consul-gen. to the Dominion of Canada; and after that time, pres. of a large manufacturing company. He died 1900, Feb. 3.

AVEREN, n. *ăv'ĕr-ĕn*, or AVERIN, n. *-ĭn* [Welsh, *avan*, a wild strawberry]: a wild strawberry.

AVERILL, *ā'vĕr-ĭl*, JOHN T.: military officer: b. Alna, Me., 1825, Mar. 1; d. 1889, Oct. 4. After completing his education at Maine Wesleyan Univ., he engaged in manufacturing in St. Paul, Minn. In 1862, Aug., he was appointed lieut.col. of the 6th Minn. infantry. He served through the war, reaching the rank of brevet brig.gen., and returned to St. Paul. A republican in politics, he was elected to congress 1871, and re-elected for a second term.

AVERNUS, *â-vĕr'nŭs*, in Gr. *Aornos*, or 'without birds,' called now Lago d'Averno: a small, nearly circular lake in Campania, Italy; between Cumæ, Puteoli, and Baiæ; about a mile and a half in circumference, occupying the crater of an extinct volcano. It is in some places as deep as 200 ft., and is almost completely shut in by steep and wooded heights. The sulphureous and mephitic vapors arising from the lake were believed in ancient times to kill the birds that flew over it; hence, according to some, its Greek appellation. Owing to its gloomy and awful aspect, it became the centre of almost all the fables of the ancients respecting the world of shades. Here was located Homer's Nekyia, or entrance to the underworld; here the Cimmerians are said to have dwelt—a people who lived in deep caverns, without ever coming into the light of day, explored metals and imparted Stygian oracles; here also were placed the grove of Hecate and the grotto of the

Cumean Sibyl. Agrippa caused the dense woods to be thinned, by which the place lost much of its wildness; and by his orders Cocceius constructed the famous tunnel through the mountain to Cumæ, a work of comparative ease, considering that the hills round about are composed of volcanic tufa. The lake was also connected in ancient times with the Gulf of Baiæ.

AVERRHO'A: see CARAMBOLA.

AVERRHOES, *a-vĕr'o-ĕz*, properly, Ibn Roshd; more fully, Abul-Walid Mohammed-Ibn, Ahmed-Ibn, Mohammed-Ibn-Roshd: 1126-1198; b. Cordova, Spain: one of the most famous of the Arabian philosophers. His father, chief judge and mufti, instructed him in Mohammedan jurisprudence. In theology and philosophy, he had Thophail for his teacher; in medicine, Ibn Zohr, the elder. His talents and acquirements made him successor to his father, and afterwards chief judge in the province of Mauritania. Being accused, through envy, of a departure from the orthodox doctrines of Mohammedanism, he was dismissed from office, and condemned by the ecclesiastical tribunal of Morocco to recant his heretical opinions, and do penance. After this, he returned to his native place, and lived in great poverty, until the Caliph Almansor reinstated him in his offices, on which he went back to Morocco, where he died. A. regarded Aristotle as the greatest of all philosophers. He translated and illustrated Aristotle's writings with great penetration; but the influence of the Alexandrine view laid down in the commentaries of Ammonius, Themistius, and others, is easily seen in his works, as in those of most of the Arabian philosophers. In opposition to the Arabian orthodox school, especially against Algazali, A. stood forth on the side of reason as the defender of philosophy. The Arabians called him, by way of eminence, the Expositor (of Aristotle). Most of his writings are known to us only through Latin translations. The Arabic text of A.'s philosophical works was published, Munich, 1859, by M. J. Müller, whose German translation of the same appeared 1875. His Commentaries on Aristotle appeared in an edition of that philosopher's works (11 vols. Ven. 1560). He wrote also a sort of medical system, which, under the name of *Colliget*, was translated into Latin, and repeatedly printed. The philosophy of A. attained to importance in the Christian Church as early as the 13th c., although his pantheistic doctrine of the unity of the active principle in the universe was often repudiated as an error, and astrology was characterized as Averrhoism. See Renan's *Averroës et l'Averroïsme*.

AVERROIST, *a-vĕr'rō-ĭst:* one of a sect deriving their name from Averrhoes; a branch of the Aristotelians, somewhat numerous in the 15th c. They held that all men have one common soul—a doctrine akin to pantheism.

AVERRUNCATOR, n. *ăv-ĕr-rŭng-kā'tor* [Eng. ob. v. *averruncate*, to root up—from L. *averrunco*, to avert]: an

instrument for pruning trees, consisting of two blades fixed at the end of a rod, made to operate like a pair of shears.

AVERSA, *â-vĕr'sâ:* town of s. Italy, province of Caserta; between Naples and Capua, 9½ m. s. of the latter, in a beautiful district rich in oranges and wine. It is well built; has a cathedral and a number of monasteries, in one of which, Andrew of Hungary, the Darnley of Neapolitan history, was murdered with the connivance of his wife, the beautiful but guilty Joanna, Queen of Naples; an excellent asylum for the insane, established by Murat; and a foundling hospital. A. was built, 1029, by the Normans on a territory ceded to them by Duke Sergius of Naples, to be held in fief. About 2 m. from A. are still a few ruins of the Oscan city of Atella, famous as the birthplace of the satirical farces so popular on the Roman stage. Pop. 20,000.

AVERSANT, a. *a-vėrs'ant* [L. *aversans*, imp. of *aversar*, to turn one's self away]: in *her.*, turned away; a term applied to a hand, of which only the back is visible. It is also called *dorsed.*

AVERSE, a. *ă-vėrs'* [L. *aver'to*, I turn away from; *aver'sus*, turned away from—from *a*, from; *verto*, I turn; *versus*, turned—*lit.*, turned away from]: disinclined to; unfavorable to; unwilling. AVERSE'LY, ad. *-lĭ.* AVERSE'NESS, n. the quality of being averse; unwillingness. AVERSION, n. *ă-vėr'shŭn*, dislike to; hatred; repugnance of mind. AVERT, v. *ă-vėrt'*, to turn aside or away from; to turn aside; to take or keep off; to prevent. AVERT'ING, imp. AVERT'ED, pp. AVERT'ER, n. one who.—SYN. of 'averse': reluctant; adverse; unwilling; disliking; indisposed; backward; loath;—of 'aversion': disgust; hatred; reluctance; repugnance; antipathy; dislike; distaste; disinclination; enmity; ill-will; rancor; malice; malevolence.

AVES, n. plu. *ā'vēz* [L. *avis*, a bird]: the class of birds. AVIAN, a. *ā'vĭ-ăn*, pertaining to birds (q. v.). AVIARY, n. *ā'vĭ-ėr-ĭ* [L. *aviārĭŭm*, a place for keeping birds]: a bird-cage; a place where birds are kept. AVIC, a. *ā'vĭk*, denoting an acid obtained from guano.

AVEYRON, *â-vā'rōn:* river in the s. of France. The river rises near Severac-le-Château; flows, for the most part westerly, through the department of A.; and, after a course of 90 m., falls into the Tarn—a feeder of the Garonne—below Montauban; touching in its course the towns of Rhodez, Villefranche, and Negrepelisse.

AVEYRON: dept. in the s. of France; 3,370 sq. m.; one of the most mountainous parts of France. Situated between the high-lands of Auvergne and the Cevennes, it slopes like a terrace s.w. to the Garonne, to the basin of which the dept. belongs. The principal rivers flow through the department from e. to w.; and between these, several ramified offsets from the chain of the Cevennes traverse the country. The climate is healthful, but cold and raw, especially in the n. and e. North of the Lot, only rye and oats are grown; in the rest of the valleys, other kinds of grain thrive, also fruit, chestnuts, potatoes, and truffles.

A third part of the land is unfit for cultivation, but affords excellent pasture for the numerous herds of cattle, goats, and sheep, which, with the breeding of swine, form the principal resources of the mountaineers. The mineral wealth of the dept. is considerable. Coal, iron, lead, zinc, copper, vitriol, alum, and antimony are abundant; the mining, preparing, and sale of which are the principal support for the inhabitants. Besides these, the principal employments are paper-making, cotton-spinning, tanning, the manufacture of woolen cloth and carpets, etc. The seat of the departmental courts is Rhodez, which is also a bishop's see. Pop. (1901) 382,074.

AVIARY: see AVES.

AVICENNA, *av-ĭ-sĕn'a:* properly, Ibn Sina; more fully, Abu Ali Al-Hossein Ibn Abdallah Ibn Sina: 980–1037; b. at Charmatain, a village near Bokhara: famous Arabian philosopher and physician, whose authority for many centuries passed for indisputable. He studied with special fondness mathematics, astronomy, philosophy and medicine. His philosophy which is largely Aristotelianism mingled with Neo-Platonism is characterized by its strong religious tendencies. God is immanent in all things and in man is represented by the active intellect which comes from God and returns to Him. His doctrines were extremely influential in mediæval thought. Dante illustrates this influence. He was physician to several of the Samanide and Dilemite sovereigns, and for some time vizir in Hamadan, but afterwards retired to Ispahan, and died during a journey of the Emir Ala-ed-Daula to Hamadan. He left a multitude of writings, among which his system of medicine, *Kanun fi 'l-Tibb*, acquired the greatest reputation. It is distinguished less by originality than by intelligible arrangement of judicious selections from the writings of the Greek physicians, at a time when the knowledge of Greek was not widely spread. A. himself knew the Greek writers only through Arabic translations. The Arabic text of the *Kanun*, and of several of his philosophical writings, among which those on metaphysics especially attracted the attention of the schoolmen, appeared at Rome 1593, 2 vols. The *Kanun* was translated into Latin by Gerardus Cremonensis, and repeatedly printed (Ven. 1595, 2 vols.). His philosophical writings have also appeared several times in Latin translations (Ven. 1490, 1523, 1564).

AVICENNIA, *ăv-ĭ-sĕn'nĭ-a:* genus of plants belonging to the order *Verbenaceæ* (q.v.), and almost exclusively confined to the s. hemisphere. The genus A. consists of trees or large shrubs resembling mangroves, and, like them, growing in salt-swamps. Their creeping roots, often curving for the space of six ft. above the mud before they stick into it, and the naked asparagus-like suckers which they throw up, have a singular appearance. *A. tomentosa*, the White Mangrove of Brazil, has cordate ovate leaves, downy beneath. Its bark is used for tanning.

AVERRHOËS.
1126—1198.

AVICULA, n. *ă-vĭk′ū-la* [L. *avĭc′ula*, a little bird]: genus of inequivalve oblique shells, with two species, also 300 fossil; type of *Aviculidæ*. which includes 'pearl-oysters.' AVICULARIUM, n. *ă-vĭk′ū-lā′rĭ-ŭm*, a curious appendage, frequently shaped like the head of a bird, found in many of the Polyzoa. AVICULOPECTEN, n. *ă-vĭk′ū-lō-pĕk′tĕn* [L. *pecten*, a comb]: an extensive genus of fossil bivalves. See PEARL OYSTER.

AVID, a. *ăv′ĭd*, or AVIDIOUS, a. *a-vĭd′ĭ-ŭs* [L. *avĭdus*, greedy]: eager; greedy. AVIDIOUSLY, ad. *-lĭ*, greedily; covetously. AVIDITY, n. *ă-vĭd′ĭ-tĭ* [L. *avid′ĭtas*, vehement desire: F. *avidité*]: eagerness; greediness; intense desire; in *chem.*, a disposition to combine with another element.

AVIFAUNA, n. *ăv′ĭ-fawn′ă* [L. *avis*, a bird; *Faunus*, a god of the fields or woods]: all the birds peculiar to a country or area.

AVIGLIANO, *â-vēl-yâ′nō:* town of s. Italy, province of Potenza, 10 m. n.w. of Potenza. Pop. 13,000.

AVIGNON, *â-vēn-yōn′* (*Avenia Cavarum*): city of Provence, in the s. of France; cap. of the dept. Vaucluse; on the left bank of the Rhone, here crossed by a long bridge. The streets are narrow and crooked. There is a multitude of churches and religious establishments, among which the cathedral on the Rocher des Dons and the church of the Franciscans, as well as the old papal palace and the tower Glacière, are distinguished. The Dominican convent now serves as a cannon-foundry. The city is the see of an abp., has a museum and picture-gallery, and other valuable institutions. The university, founded 1303, was abolished 1794. A. has manufactures of silk, silk-dyeing, tanning, iron-founding, etc., and is famous for its garden produce, fruit, wine, honey, etc. The country about A. is delightful, and extremely fruitful in corn, wine, olives, oranges, and lemons.—In A., Petrarch spent several years; it was here he saw Laura, whose monument is in the Franciscan church. Vaucluse, which he has immortalized, is about three leagues from Avignon. A. was the cap. of the ancient Cavares, and presents many remains of the times of the Romans. In the middle ages, it formed, with the surrounding district, a county, which the popes, who had already received the county of Venaissin as a gift from King Philip III., bought in 1348 from Joanna, Queen of Naples and Countess of Provence. The pope governed both counties through a vice-legate, and continued in the possession of them till 1790, when, after several stormy and bloody scenes, the city with its district was united with France. At the peace of Tolentino (1797), the pope formally resigned A. and Venaissin. A. is celebrated in ecclesiastical history as being, for a time, the residence of the popes. By order of Philip IV. of France, Pope Clement V. and six of his successors 1309–77, were obliged to reside there. It was afterwards the residence of more than one anti-pope. Two ecclesiastical councils were held at A. (1326 and '37): the first took into considera-

tion the relation of the clergy to the laity; the other, the bad training of the clergy. Pop. (1901) 46,896.

AVIGNON-BERRY, n.: the berries of the *Rhamnus infectorius, saxatilis*, and *amygdalinus*. They are used for dyeing yellow. When they are ripe the juice is mixed with alum, to make the sap-green of the painters.

AVILA, *â'vē-lâ:* town of Spain, cap. of the province of A., in Old Castile; 53 m. n.w. of Madrid. The Spaniards declare that its original name was Abula, and please themselves and amuse strangers with the belief that it was built by Hercules B.C. 1660. It is the birthplace of two highly remarkable persons—one, the learned Alfonso Tostado de Madrigal (d. 1455), whose doctrines (according to his biographer) were so enlightened that they caused the blind to see, though in the opinion of Don Quixote, he was more voluminous than luminous: the other, 'Our Seraphic Mother, the Holy Teresa, Spouse of Jesus,' b. 1515, March 28; she was made the lady-patroness of Spain by Philip III., and shares the honors of worship with St. James. A. is the see of a bp., with a beautiful cathedral, and was formerly one of the richest and most flourishing cities of Spain. The univ., founded 1482, enlarged 1638, was abolished 1807. It was at A. that the nobles of Old Castile assembled, 1465, to depose King Henry IV., and raise his brother Alfonso to the throne of Leon and Castile. At A., also, was the meeting of the so-called Third Estate, or of the Holy League, 1520, under the leadership of Juan Padilla, to which nearly all the cities of Castile sent representatives. Pop. of A. 9,000.

The province of A. has 2,981 sq. m.; pop. (1900) 200,457.

AVILA, Gil Gonzalez de: 1559–1658; b. Avila, Old Castile; a Jesuit and canon of Salamanca; royal historiographer for Castile and the Indies. He composed a great number of historical works, of which the following may be mentioned as containing many valuable facts: *Historia de la Vida y Hechos del Rey Don Henrique III. de Castilla* (Madr. 1638); *Historia de la Vida y Hechos del Monarca D. Filipe III.* (in Mendoza's *Monarquia de España*, 3 vols. Madr. 1770); *Historia de Salamanca* (Salam. 1606); and the *Teatro Ecclesiastico de la primitiva Iglesia de las Indias Occidentales* (2 vols. Madr. 1649–56).

AVILA Y ZUNIGA, *â've-lâ ē thôn'yē-gâ*, Don Luiz de: 16th c. Spanish general, diplomatist, and historian; born at Placencia, in Estremadura; enjoyed the favor and confidence of Charles V., who intrusted him with embassies to the popes Paul IV. and Pius IV., and made him grand master of the order of Alcantara. He accompanied the emperor on his expeditions to Africa, 1535, and against the princes of the league of Schmalkald, and wrote an account of the war which goes under that name, partial, indeed, but able and spirited. The *Commentarios de la Guerra de Alemanna hecha por Carlos V. en* 1546 *y* 1547, have been published repeatedly (first, Ven. 1548), and translated into several languages.

AVILES, *ā-ve-lĕs* (anc. *Flavignavia*): town of Asturias,

Spain, province of Oviedo; 19 m. from Oviedo. There are coal and copper mines in the vicinity. Manufactures of earthenware, glass, linen, etc., are carried on. Pop. 8,400.

AVISE, or AVIZE, v. *ă-vīz'* [F. *avis*, an opinion: It. *viso:* OF. *vis*, way of seeing a thing, opinion—from L. *vīsus*, seen]: in *OE.*, to consider; to advise; to counsel: N. advice; intelligence.

AVIZ, *â-vĭs':* order of knighthood in Portugal, instituted by Sancho, first king of Portugal, in imitation of the order of Calatrava, and having, like it, for its object the subjection of the Moors. By the present usage, the king of Portugal wears decorations of the first three orders of Portugal—those of Christ, St. James, and Aviz united in one medal divided into three equal spaces: he is grand master of all the orders.

AVOCATION, n. *ăv'ō-kā'shŭn* [L. *avocātĭōnem*, a calling off from any occupation—from *a*, from; *vŏco*, I call]: a calling off from e.g., from one's occupation or business. Avocation is frequently though improperly used for business, occupation, vocation.

AVOCET, or AVOSET, n. *ăv'ō-sĕt* [F. *avocette*], (*Recurvirostra*): genus of birds, which, though having the feet webbed nearly to the end of the toes, is usually ranked among the *Grallæ* or *Grallatores*, on account of the length of the legs, the half-naked thighs, the long, slender, elastic bill, and the general agreement in habits with snipes. They are distinguished from all other birds, except a few species of humming-bird, by the strong upward curvature of the bill, which is much like a thin piece of elastic whalebone, and most probably a delicate organ of touch, adapted for seeking food in mud, as their webbed feet are for walking upon it, and their long legs for wading in the fens and marshes which they frequent. They are birds of powerful wing, not much addicted to swimming. They scoop through the mud with the bill, first to one side, and then to the other, in quest of worms and other small animals: though Audubon has also observed the American Avocet taking insects which were swimming on the surface of the water, and expertly catching them in the air, running after them with partially expanded wings. The Common Avocet (*R. avocetta*), the body of which is about as large as that of a lapwing, is sometimes, though very rarely, found in the fenny districts of England; it is a native also of the continents of Europe, Asia, and Africa, occurring even at the Cape of Good Hope.

AVOGADRO'S LAW: see ATOMIC THEORY.

AVOID, v. *ă-vŏyd'* [OF. *vuide*, empty; *vuidier*, or *voidier*, to empty: L. *a*, from; *vito*, I shun; perhaps L. *a*, for *ex*, out; *vĭdŭŭs*, empty]: to keep at a distance from; to get out of the way of; to shun; to evacuate; to become vacant. AVOIDABLE, a. *ă-vŏyd'ă-bl*, that can be kept from or shunned. AVOID'ANCE, n. *-ăns*, the act of becoming

vacant by death or otherwise; the act of making vacant: in Eng. ecclesiastical law, opposed to *plenarty* or fulness. See BENEFICE. AVOID'ING, imp. AVOID'ED, pp. AVOID'ER, n. one who. SYN. or 'avoid': to escape; elude; defeat or evade; shun; eschew; annul.

AVOIRDUPOIS, n. or a. *ăv-ėr'dū--poyz'* [F. *avoir*, to have; *du*, of the; *poids;* OF. *pois*, weight—*lit.*, goods that sell by weight]: the weight of 16 oz. to the pound, employed in selling goods by weight, usually all except the precious metals and precious stones. (The word is generally said to be derived from the French *avoir du pois*, to have weight; but the middle-age Latin word *averia* or *avera*, used for goods in general, or the middle-age Latin *averare*, and French *avérer*, meaning to *verify*, are, by some, thought to offer more probable etymologies.)

The grain is the foundation of the Avoirdupois system, as well as of the Troy. A cubic inch of water weighs 252.458 grains. Of the grains so determined, 7,000 make a pound A., and 5,760 a pound Troy. See WEIGHTS AND MEASURES.—The A. pound is divided into 16 ounces, and the ounce into 16 drams. A dram, therefore, contains $27\frac{11}{32}$ grains, and an ounce $437\frac{1}{2}$ grains.

TABLE OF AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ grains	are	1 dram,	1 dr.
16 drams or drachms	"	1 ounce,	1 oz.
16 ounces	"	1 pound,	1 lb.
28 pounds	"	1 quarter,	1 qr.
4 quarters	"	1 hundredweight,	1 cwt.
20 hundredweight	"	1 ton,	1 ton.

The above table is according to usage in the United States; though in many transactions it is understood that the cwt. contains only 100 lbs., and the ton 2,000 lbs.

A cubic ft. of water weighs 997.14 ounces A., or nearly 1,000 ounces, which gives an easy rule for determining the weight of a cubic ft. of any substance from its specific gravity.

AVON, *ā'von:* a word of British or Celtic origin, meaning 'river' or 'stream,' which seems allied to Aa (q. v.), the name of so many continental rivers. It is the name of several of the smaller British rivers, among which are: 1. The Upper or Warwickshire A., which rises in n.w. Northamptonshire, runs s.w. through Warwickshire and Worcestershire, passing Rugby, Warwick, Stratford, and Evesham, and joining the Severn at Tewkesbury. It has a course of 100 m., and receives several tributaries. 2. The Lower, or Bristol, or West A., which rises in n.w. Wiltshire, and runs 70 or 80 m., first s. in Wiltshire, and then w. and n.w. between Gloucestershire and Somersetshire. It traverses an oolitic basin, and runs generally between deep banks in a rich valley, passing Bradford, Bath, and Bristol, and empties into the Bristol Channel. It is navigable for large vessels up to Bristol. A canal through the middle of Wiltshire connects it with the Thames. 3. The Wiltshire and Hampshire, or East A., which rises in

the middle of Wiltshire, and runs south 70 m. through Wiltshire and Hampshire, passing Amesbury, Salisbury, and Ringwood, and entering the English Channel at Christchurch. In Wales two rivers named A.—one rising in Monmouthshire, the other in Glamorganshire—fall into Swansea Bay. In Scotland there are several of the same name, affluents of the Spey, Annan, Clyde, and Forth.

AVONDALE, a parish of Scotland in the county of Lamarck, the scene of the battle of Drumclog, 1679, June 1, when Grahame of Claverhouse, the famous Viscount Dundee, was defeated by the forces of the Scotch Covenanters. A description of the battle is given in Scott's *Old Mortality*.

AVOUCH, v. *ă-vowch'* [Norm. F. *advoucher*—from L. *ad:* OF. *voucher*, to vouch, to justify: F. *avouer*, to avow—applied to the admission by a tenant of a certain person as his feudal superior; called in mid. L. *advŏārĕ*—from L. *advoāĕrĕ*]: to maintain or defend the rights of another; to affirm; to assert; to affirm in favor of. AVOUCH'ING, imp. AVOUCHED, pp. *ă-vowcht'*. AVOUCH'ER, n. one who. AVOUCHABLE, a. *-a-bl*, that may be avouched. AVOUCH'MENT, n. *-mĕnt*, the act of avouching; the state of being avouched; that which is avouched.

AVOW, v. *ă-vŏw'* [OF. *avoer:* F. *avouer*, to avow, to confess—see above]: to declare openly with a view to justify; to affirm resolutely or boldly; to own or confess. AVOW'ING, imp. AVOWED, pp. *ă-vowd':* ADJ, declared without disguise. AVOWEDLY, ad. *ă-vow'ĕd-lĭ*, in an open, undisguised manner. AVOW'ER, n. one who. AVOWABLE, a. *ă-vow'ă-bl*, that may be openly acknowledged. AVOWABLY, ad. *-blĭ*, in a way that can be avowed. AVOW'AL, n. an open confession or declaration.—SYN. of 'avow': to own; recognize; acknowledge; confess.

AVOWANT, n. *a-vow'ant*, in Law: 'a person making cognizance,' or admitting that he distrained certain goods belonging to another, but maintaining that he was justified in doing so.

AVOWEE, n. *a-vow'ē* [F. *avoué*, formerly, the protector of a church or religions community; *now*, a lawyer]: an acknowledged friend: in *Eng. law*, a person to whom the advowson of a church belongs.

AVOWRY, n. *a-vow'rĭ* [OF. *avouerie*—from L.L *advocaria*]: a term used when, on a person suing replevin of goods, which he alleges that the defendant distrained, the latter, in reply, avows or openly declares that he did take the goods, but adds that he had proper justification of the deed.

AVRANCHES, *â-vrônsh'* (anc. *Abrancæ*): city of the dept. of Manche, France, near the left bank of the Seez, 33 m. s.s.w. from St. Lo; on the sides and summit of a high hill. It has manufactures of lace, tiles, and bricks, and a little trade in grain, butter, cattle, etc. Pop. 7,800.

AVULSED, a. *ă-vŭlst'* [L. *avul'sus*, torn or pulled away —from *a*, from; *vulsus*, plucked or pulled]: plucked or

pulled off. AVULSION, n. *ā-vŭl'shŭn* [F.—**L.**]: a pulling or tearing asunder one thing from another.

AVUNCULAR, a. *a-vungh'u-lâr* [L. *avunculus*, a maternal uncle—from *avus*, a grandfather; Eng. suffix, *-al*]: pertaining to an uncle.

AWAIT, v. *ă-wāt'* [*a* for L. *ad:* OF. *waiter:* F. *guetter*, to watch: *a*, and *wait* (see WAIT)]: to look for; to be ready for; to expect; to be in store for: N. in *OE.*, ambush; watch: V. to attend upon; to watch. AWAIT'ING, imp. AWAIT'ED, pp.

AWAKE, v. *ă-wāk'* [AS. *awacnian* or *awacan*, to awake (see WAKE)]: to rouse from sleep; to infuse new life into: ADJ. not sleeping; in a state of vigilance. AWAK'ING, imp. AWAKED, pp. *ă-wākt'*. AWOKE, pt. *ă-wōk'* [AS. *awoc*, and *awacode*, awoke]: roused from sleep. AWAKEN, v. *ă-wāk'n*, same meaning as *awake*. AWAKENING, imp. *ă-wāk'nĭng:* N. the act of arising from sleep, lethargy, or death, or of being excited to action; the state of being aroused from any of these; *familiarly*, a revival of religion. AWAKENED, pp. *ă-wāk'nd*. AWAKENER, n. *ă-wā'kn-ẽr*, one who. AWAKENINGLY, adv. *a-wāk'nĭng-lĭ*, in a manner to waken. TO BE WIDE AWAKE, silently but carefully on the watch; quite aware of what is being done.—SYN. of 'awake, v.': to excite; rouse or arouse; incite; stimulate.

AWANTING, imp. or a. *ă-wawnt'ĭng* [AS. *a*, intensive; and *wanting*]: denoting absence; missing; wanting.

AWARD, v. *ă-wawrd'* [prov. F. *eswarder*, to inspect goods: It. *guardare:* F. *regarder:* OH. Ger. *warten*, to look at—*lit.*, to look at for forming a judgment]: to assign to by sentence; to adjudge; to determine: N. a sentence; the decision of arbitrators. AWARD'ING, imp. AWARD'ED, pp. AWARD'ER, n. one who.

AWARE, a. *ă-wār'* [AS. *gewaere:* Ger. *gewahr*, aware: OH. Ger. *gawar*]: informed of; foreseeing; vigilant; on one's guard.

AWAY, ad. *ă-wā'* [AS. *aweg:* prov. Ger. *eweg:* Ger. *weg*, way, and *weg*, away]: at a distance; absent; in a state of absence; signifying in phrases, moving or going from. INT. begone! let us go! AWAY WITH, take away. TO MAKE AWAY WITH, to kill; to destroy. AWAY-GOING, applied to the last crop a tenant has to cut down; designating a tenant about the end of his lease, and leaving his holding or farm. I CANNOT AWAY WITH, I cannot endure or tolerate.

AWE, LOCH: lake in the centre of Argyleshire, 108 ft. above the sea; extending n.e. and s.w. about 24 m., with an average breadth of from half a mile to 2½ m. The country around consists of mica slate. The scenery is most striking at the n.e. end of the lake, where the water is studded with numerous wooded islets, overshadowed by towering and rugged mountains, prominent among which rises the dark and rocky ridge of Ben Cruachan, 3,669 ft. high, and 14 m. in circuit. Of the islands, the most noted is Fraoch-eilean, containing the remains of a castle granted to Gilbert M'Naughton, 1267, by Alexander III. On a pen-

insula, in the n. end of the lake, stands Kilchurn Castle (Caesteal Chaoil-chuirn), once a fortress of great strength, built about 1440 by Sir Colin Campbell of Glenorchy, and garrisoned, as late as 1745, by the king's troops. The waters of the lake (which seldom freezes) are carried off at its n.w. end by the river Awe, which, after a course of 7 m., enters the sea at Bunawe on Loch Etive. The magnificent 'Pass of Awe,' through which the road runs beneath the shoulder of Ben Cruachan, was the scene of a conflict, 1308, between Robert the Bruce and the M'Dougalls of Lorn, in which that clan was almost exterminated. At the n.e. end of the loch, it receives the waters of the Orchy and Strae. Loch A. contains fine fish, especially trout, *Salmo ferox,* and salmon; and the small villages of Claddich and Port Sonachan are a resort of anglers. The n. end of the loch is skirted by the railway from Callander to Oban.

AWE, n. *aw* [AS. *ege:* Dan. *ave,* correction, fear: Icel. *ægir,* terrible]: fear mingled with reverence; solemn dread; reverential fear: V. to influence by fear; to strike with reverence. AW'ING, imp. AWED, pp. *awd.* AWE'LESS, a. AWESOME, a. *aw'sŭm,* appalling; causing terror; expressive of fear or reverence. AWE'STRUCK, impressed or struck with awe. AWFUL, a. *ăw'fool,* that inspires or strikes with awe; terrible; dreadful; in *OE.,* in authority; worthy of respect. AW'FULLY, ad. *-lĭ.* AW'FULNESS, n. the quality of striking with awe; solemnity. AWFUL-EYED, a. having eyes fitted to inspire awe.—SYN. of 'awe, n.': fear; dread; reverence; veneration;—of 'awful': dreadful; fearful; frightful; terrible; terrific; tremendous; horrid; horrible; formidable; direful.

AWEARY, a. *ă-wēr'ĭ* [AS. *a,* and *weary*]: weary; tired.

A-WEATHER, ad. *ă-wĕth'ėr* [*a,* to, and *weather*]: a sea-term denoting 'on the side exposed to the weather,' or that on which the wind blows, as opposed to *a-lee,* on the side sheltered from the wind: a helm is said to be A. when pressed close to the weather side of the ship.

AWEIGH, ad. *ă-wā'* [*a,* and *weigh*]: a sea-term, applied to the position of an anchor when just loosened from the ground, and hanging vertically in the water; nearly equivalent to *a-trip.*

AWHAPE, v. *ă-hwāp'* [W. *chwaff,* a gust: Icel. *kefia,* to suffocate: Sw. *quaf,* choking]: in *OE.,* to take away the breath with astonishment; to dismay; to terrify.

AWHILE, ad. *ă-hwīl'* [*a.* and *while*]: for a short time.

AWHIT, n. or ad. *ă-hwĭt'* [AS. *a,* on, and *whit*]: a whit, a jot; a tittle.

AWKEND, n. *awk'ĕnd* [etymology doubtful. Dut. *averechts* (?) wrong, backwards; or AS. *aweg* (?) away, out; or O. Icel. *af,* (?) off]: the butt-end of a rod or wand.

AWKWARD, a. *awk'wėrd* [AS. *awoh,* awry: Icel. *afguta,* a side-way: Sw. *afwig,* inside out]: left-handed; unskilful; clumsy; bungling; difficult; unable to use hands or tools easily; in *OE.,* unfortunate; untoward; adverse.

AWK'WARDLY, ad. *-lĭ.* AWK'WARDNESS, n. the state of being awkward; clumsiness.—SYN. of 'awkward': perverse; indirect; left-handed; unskilful; clumsy; ungainly; uncouth; ungraceful; inelegant; impolite; bungling; unready; unfavorable; adverse.

AWL, n. *awl* [AS. *æl:* Ger. *ahle:* Icel. *alr*]: a pointed tool for punching holes. AWL'SHAPED, a.

AWLWORT, n. *awl'wėrt* [*awl*, from the shape of the leaves; and *wort*]: a stemless aquatic plant extending its leaves two or three feet under water; the *Subulārĭă aquat'ĭca*, ord. *Crucif'erœ*. Native of lakes, Me., N. H., and Europe.

AWME, or AUME, n. *awm* [Ger. *aum*]: a German measure of capacity for liquids, especially for the Rhenish wines, containing 41 English wine-gallons.

AWN, *awn* n. [Icel. *ögn:* Sw. *agn:* Gr. *achnē*, chaff]: a scale or husk of anything; the beard of corn or grass; the bristle-like elongation of the midrib of a bract. AWN'LESS, a. AWNY, a. *awn'ĭ*, pertaining to. AWNED, a. *awnd*, furnished with awns.

AWN (*Arista*): in the flowers of Grasses, a solitary pointed bristle, growing either from a glume or a palea. The flowers of some grasses are entirely *awnless;* in many, the glumes alone are *awned* (or *aristate*), or only one of them; in others, the glumes are awnless, and the paleæ, or one palea, awned. The awn is often terminal, and appears as a prolongation of the midrib of the glume or palea; from which, however, it sometimes separates below the point, and is then said to be on the back of it, or *dorsal;* sometimes it is jointed at the base, and finally separates at the joint; sometimes it is knee-bent or geniculate; sometimes it is twisted and liable to twist and untwist hygrometrically; sometimes it is rough, or even serrate, at the edges, as in barley; sometimes it is feathery, as in feather-grass (*Stipa*), which is remarkable for the great length of its awn. The characters of genera and species are often derived from it, but it is not invariable, even in the same species, and the cultivated varieties of wheat and oats differ much in being more or less *bearded.*

AWNING, n. *awn'ing* [Pers. *awang*, something hung, hence probably OF. *auvent:* mid. L. *auvanna*, a penthouse of cloth before a shop-window]: a cover spread above the deck of a vessel, or any open place, or fastened to the windows, doors or porches of a house to afford shade.

AWRY, a. or ad. *ă-rī'* [AS, *a.* on. and Eng. *writhe*, to twist—*lit.*, on the twist (see WRITHE and WRY)]: asquint; obliquely; not in a straight line; uneven; crooked; aside from the straight line of truth; perversely.

AWS, or AWES, n. *awz* [Old Sw. and Ger. *ach*, water]; the buckets or projections on the rim of a mill-wheel designed to receive the shock of the falling water.

AX, n. or AXE, *ăks* [AS. *æx:* Icel. *öxi:* Dan. *ökse:* Gr. *axīnē*, an ax]: a tool with an iron blade used for chopping. AX'-HEAD, n. AX-HELVE, n. the handle of an ax. AX'-

SHAPED, a. AX-STONE, n. a mineral; a sub-species of jade, of a deep sea-green or leek color, used by the New Zealanders and certain South Sea Islanders in making hatchets, etc. AXINITE, n. *ăk'sĭn-īt*, a mineral, one of the garnet family—so called from the ax-like form of its crystals.

AXAYACAT, n. *ăks'ā-a-kăt*, or AXAYACATL, *ăks'ā-a-kătl* [Mexican]: a Mexican fly, the eggs of which, deposited abundantly on rushes and flags, are collected and sold as a species of *caviare*. The use of these as an article of food was learned by the Spanish settlers from their predecessors, the native Indian Mexicans, who called the dish now described *ahuauhtli*.

AXE: name of two small rivers in the s.w. of England. One rises in the Mendip Hills, n. of Somerset, runs first s.w., and then n.e., through a carboniferous limestone, trias, and diluvial basin, past Wells and Axbridge, into the Bristol Channel. The other rises in w. Dorset, and flows 21 m. s. and s.w., through e. Devonshire, in an oolitic and trias basin, past Axminster into the English Channel. A. is only another form of Exe. See AA.

AXEL, *ăks'ĕl*, or ABSALON, *ăb'să-lŏn'*: Abp. of Lund in Denmark, and minister and general of King Waldemar I.: 1128–1201; descendant of a distinguished family. In youth studied at Paris. A. was notable for wisdom and uprightness in peace, and valor and address in war. He drove the Wendish pirates from the coasts of Denmark, and subdued them in their own settlements. He defeated the Pomeranian prince, Bogislav, and made him dependent on Denmark. In the wise legislation of Waldemar and of his son, he took a great part. He promoted learning, and to his encouragement we owe the first connected history of Denmark by Saxo Grammaticus. By building a fortified castle for defense against the pirates, he laid the foundation of the great city of Copenhagen, then an insignificant fishing village; whence the city sometimes has the name of Axelstadt. A. was buried in the church of Soroe, where he had founded a monastery. See the latest complete biography of A. by Estrup, trans. into German by Mohnike in Illgen's *Zeitschrift für Historische Theologie* (2 vols. Leip. 1832).

AXESTONE, *aks'stōn:* a mineral generally regarded as a variety of Nephrite (q.v.). It is greenish, more or less translucent, hard, tough, and not easily broken. It occurs in primitive rocks, always massive, in Saxony, in Greenland, and in New Zealand, and other islands of the s. Pacific. It derives its name from the use to which it is put by the natives of these islands for making their hatchets. They also make ear-drops of it.

AXHOLME ISLE, *aks'hōlm īl* [A. Sax. *holme*, a river-isle]: low level tract in the n. of Nottinghamshire, surrounded by rivers—the Trent on the e.; Don. n. and w.; Torne and Idle, on the w.; and Vicardyke, between the Trent and Idle on the s. This district, 18 m. from n. to s., and 5 on an average e. and w., was anciently a forest, but afterwards became a marsh. The marsh was drained into the Trent, 1634, by Vermuyden, a Dutchman, after

five years' labor, and at the cost of £56,000. The reclaimed land became very fertile under Dutch and French Protestant settlers, and after much litigation it was, 1691, divided, the original inhabitants receiving 10,532 acres and the settlers 2,868. On the land are raised abundant crops of wheat, oats, rye, peas, beans, clover, flax, rape, hemp, potatoes, and onions. Peat and turf fuel abound, and valuable gypsum beds occur. The water is brackish, too hard for washing, and curdles milk when boiled with it. Axholme Isle includes seven parishes. There are two small towns, Crowle and Epworth.

AXIAL, a.: see under Axis.

AXIL, n. *ăk'sĭl* [L. *axil'la*, the armpit: Icel. *öxl*, the shoulder-joint: Dut. *oxel*]: the armpit; in *bot.*, the upper angle formed by the attachment of a leaf or branch to its support. Buds usually grow in the axils of leaves, though they are not always actually developed; but a bud may be made to appear in such a situation, and to form a new shoot or branch, by artificial means, which direct the strength of the plant more particularly to that quarter, as cutting over the main stem, wounding it above the place where the new branch is desired, etc. Flowers or flower-stalks (*peduncles*) growing from the axils of leaves are called *axillary*. Axillar, a *ăk'sĭl'lėr*, or Ax'illary, a. *-lėr-ĭ*, pertaining to the armpit; arising from the axil in plants. Axicle, n. *aks'ĭ-kl* [dim. of *axil*]: a sheave.

AXILLA, n. *ăk'sĭl-â*, the axilla, or armpit, is the cone-shaped space lying between the arm and the side of the chest and bounded above by the shoulder-joint. Anteriorly it is limited by the pectoral muscles, and posteriorly by the latissmus dorsi and subscapularis muscles. The axilla contains many important structures: the large nerve cords, proceeding from the brachial plexus, the main artery supplying the arm and its accompanying vein, and a number of lymphatic glands, all embedded in a loose framework of connective tissue.

AXIM, *â-shēng'*, or *âks-im':* important station and port on the Gold Coast, a little to the e. of the mouth of the Ancobrah river. Inland from A., in the basin of that river, and in the dist. between it and the Prah, gold-mining operations have recently been carried on on a large scale. See Burton and Cameron, *To the Gold Coast for Gold* (1882).

AXINE, a. *ăks'ĭn* [L. *axis:* Eng. *-ine*]: pertaining to a group of stags, of which *Cervus axis*, Linnæus, the Spotted Axis, is the type: N. a member of the A. group of stags. See Axis.

AXINOMANCY, n. *aks-in'ō-măn-sĭ* [Gr. *axīnē*, an ax; *mantei'ă*, divination]: a mode of divination by means of an ax, much practised by the ancient Greeks, particularly with the view of discovering the perpetrators of great crimes. An ax was poised upon a stake, and was supposed to move so as to indicate the guilty person; or the names of suspected persons being pronounced, the motion of the

ax at a particular name was accepted as a sign of guilt. Another method of A. was by watching the movements of an agate placed upon a red-hot ax. See DIVINATION: DIVINING-ROD.

AXINURUS, n. *ăks-ĭn-ūr′ŭs* [Gr. *axine*, an ax; *oura*, tail]: genus of spiny-finned fishes, placed by Cuvier under his family *Theutyes*.

AXIOM, n. *ăk′sĭ-ŭm* [Gr. *axĭōma*, an established or conceded principle, a self-evident truth; a principle accepted without proof, as a basis of reasoning; an established principle in an art or science. AXIOMATIC, a. *ăk′sĭ-ō-măt′ĭk*; or AX′IOMAT′ICAL, a. *-ĭ-kăl*, relating to an axiom, obvious, self-evident. AX′IOMAT′ICALLY, ad. *-kăl-ĭ*. —SYN. of 'axiom': maxim; aphorism; apothegm; saying; adage; proverb; by-word; saw; truism; principle.

AXIOM, *ăk′sĭ-ŭm:* a general proposition which the understanding recognizes as true so soon as the import of the words conveying it is apprehended. Such a proposition is therefore known directly, and does not need to be deduced from any other. Of this kind, for example, are all propositions whose predicate is a property essential to our notion of the subject. Every rational science requires such fundamental propositions, from which all the truths composing it are derived; the whole of Euclidian geometry, for instance, rests on a very few axioms. Whether there is, for the whole of human knowledge, any single, absolutely first A. from which all else that is known may be deduced, is a question that has given rise to much disputation; but the fact that human knowledge may have various starting points, answers it in the negative.

Mathematicians use the word A. to denote those fundamentalpropositions, not susceptible of proof themselves, from which all the rest of the science can be logically deduced. An A. is therefore an assumption, and is not correctly defined as a 'self-evident truth.' Thus the Euclidian A. regarding parallels (5th Postulate) 'Through a given point only one line can be drawn parallel to a given line' is self-evident only to the extent that we can verify it experimentally for a short distance and within the limits of error of measurement; it is therefore doubtful if it is 'true;' and consistent (non-Euclidian) geometries have been constructed in which this postulate is denied. See PARALLELS. The term A. is employed for assumed mathematical theorems in general, geometric assumptions being called postulates. Scientific perfection requires that thenumber of axioms or postulates employed should be reduced to a minimum. They must of course be so chosen as to be consistent with each other. Euclid rested the whole of geometry on nine axioms (common notions, the term A. is of later introduction) and six postulates. But geometry really involves a much larger number of implicitassumptions. Of recent years the foundations of geometryhave been exhaustively examined by Peano and Hilbert,who have determined the complete set of axioms actuallynecessary to the logical treatment of the science.

See the review of Hilbert by D. E. Smith in the *Educational Review*, 1900, January.

AXIS, n. *ăk'sĭs*, AXES, n. plu. *ăk'sēz* [L. *axis;* Gr. *axōn;* Ger. *achse*, a pole or axle-tree, a pivot: Sks. *aksha*, a wheel]: the line, real or supposed, round which anything revolves; in *bot.*, the central portion of the young plant whence the plumule and radicle are given off; the central organ which gives rise to buds; in *anat.*, the second vertebra of the neck upon which the first vertebra rotate. AXIAL, a. *ăk'sĭ-ăl*, of or relating to an axis. AXIALLY, ad. *-lĭ*. AXLE, n. *ăk'sl*, or AXLE-TREE [AS. *eaxl*, the shoulder: Icel. *öxl*, the shoulder-joint; *öxull*, an axis: Dan. *axel*, an axle; and *tree*, in the primary sense of a block or piece of wood]: the wooden or iron bar round the ends of which wheels can turn. AXLED, a. *ăk'sld*, furnished with axles. AXIFEROUS, a. *ăks-'if'ĕr-ŭs* [L. *axis; fero*, I bear]: bearing an axis. AX'IFORM, a. of the form of an axis. AXIS DEER, an Indian species of deer marked with white spots. AXLE-BOX, the part of a locomotive or carriage within which an axle turns, and on which the weight of the machine rests.

AXIS, in Botany: the central part both above and below ground, around which the whole plant is regarded as arranged. The stem is called the *ascending A.;* the root the *descending axis*. The opposite tendencies of growth appear as soon as a seed begins to germinate, in the radicle and plumule; the former of which is the descending A., and the latter the ascending A., the former descending deeper into the soil, the latter ascending towards the air and light. That part of the stem around which the flowers are arranged is called the *floral A.*, and, in describing some kinds of inflorescence, the terms *primary floral A.*, *secondary floral A.*, etc., are occasionally employed

AXIS, *ăk'sĭs*, in Geometry: a central line. The A. of a curved line is formed by a right line dividing the curve into two symmetrical parts, so that the part on one side exactly corresponds with that on the other; as in the parabola, the ellipse, and the hyperbola. The A. of any geometrical solid is the right line which passes through the centre of all the corresponding parallel sections of it: in this sense, we speak of the A. of a cylinder, a globe or a spheroid. By the A. of rotation, we understand the right line around which a body revolves.—In physical science, the A. of a *lens* is the right line passing through it in such a manner as to be perpendicular to both sides of it; and the A. of a telescope is a right line which passes through the centres of all the glasses in the tube. The A. of the *eye* is the right line passing through the centres of the pupil and the crystalline lens.

AXIS (*Cervus Axis*): species of deer, abundant on the banks of the Ganges, but found throughout Indiand in many islands of the Eastern Archipelago. One of its Indian names is Chittra, and by British sportsmen India it is generally called the Spotted Hog-deer. In some

naturalists, it has been made the type of a genus of *Cervidæ*, called *Axis*. The A. has a great resemblance in size and coloring to the European fallow-deer; it is generally of a rich fawn color, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns, however, differ very much from those of the fallow-deer, being slender, sharp-pointed, little branched, and not at all palmated. The female has no horns. The A. frequents thick jungles in the vicinity of water, and feeds during the night. It is commonly found in herds of 15 or 20, of which 3 or 4 are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to approach within shot. The males, however, sometimes exhibit great courage in the defense of the young. It is very easily domesticated, is very gentle in its manners, has been frequently imported into Europe, and breeds freely in the parks in which it is kept.

AXLE, n. *āk'sl* [AS. *eaxl*, the shoulder: Icel. *öxl*, the shoulder-joint; *oxull*, an axis: Dan. *axel*, an axle]: a cross-bar carrying the wheels (or wheel) of a vehicle and supporting it—when made of wood also called axletree. The first A. were made of wood, hence the name axletree, axle signifying the joint, and tree being used in the primary sense of wood. A *live* A. is one that rotates, being fast to the wheel; it is almost always a *driving* A., that is, one through which power is applied to turn a wheel and thus move the vehicle. The A. of the large wheels of a locomotive are of this character; the smaller wheels ahead are mounted on a leading A., and those behind on a trailing A. A *dead* or *blind* A. is fixed, does not rotate and delivers no power. A *divided* A. is one cut in two at some point in its length, thus permitting different rotation of the opposite wheels, so that one may go faster than the other, as required in going around a corner. A *compound* A. is one made in two parts connected by a sleeve or the like. A *telescopic* A. is one that may be lengthened or shortened by one part sliding over and around the other, as on a railway car, that it may be run on tracks of different gage (that is, with rails set at different distances apart). A *muley* (or *mulay*) A. is one that operates without flanges or collars, as when supporting a flange on a locomotive, or carrying a car-wheel without any retaining collar. A *sleeve* A. is one consisting of a sleeve or tube that plays around another axle or part of an axle.

Carriage and wagon A. are generally made with a downward dip or curve at the ends, so that the lower edges of the wheels are brought closer than the tops. This positions the wheel so that it is better able to withstand strain when the vehicle is on a slope, putting most of the stress on the lower wheel. Iron A. are frequently made with large curves to either raise or lower the body of the vehicle which they support. The wheels of a wagon, car, etc., turn loose on the A., so that the vehicle may easily be turned around, but in an automobile, where both the rear wheels are driv-

ers and made fast to the axle, the independent turning of the wheels is made possible only by dividing or cutting the axle in two parts and rotating them by a differential or equalizing mechanism. (See EQUALIZER.) The front wheels of automobiles are usually hung to very short A., arranged so as to turn independently. The A. of a bicycle is ordinarily a short tube to which the spokes are fixed, and having enlarged ends for holding ball-bearings. AXLE-ARM, n. that part of an A. passing through the hub or centre of the wheel. AXLE-BAR, n. that part of an A. between the axle-arms. AXLE-BOX, n. a box containing friction-reducing appliances, for allowing the wheel to turn easily on the axle arm; a journal-box for an axle. AXLE-CLIP, n. a thin metal attachment bolted to a wheel and bent so as to connect some part, as a shaft. AXLE-GUARD, n. a projection or guard limiting the vertical motion (or up and down play) of an axle-box on a railway car. AXLE-PIN, n. a pin run through the end of an A. to keep the wheel on; a linch-pin. AXLE-SKEIN, n. a metal covering for protecting from undue wear the tapered arm of a wooden A. AXLE-SLEEVE, n. a tube or sleeve surrounding an axle, as for maintaining the parts of a divided or telescopic axle, or for protection in case of accident. AXLE-SPINDLE, n. a tapered end of an A.; an axle-arm for working in a hub. AXLED, a. *ăk'sld*, furnished with axles. AXLETREE, n. an axle, especially a wooden axle as made before the general introduction of iron axles.

AXMINSTER, *ăks'mĭn-stėr:* small town in e. Devonshire, on the side of a little hill on the left bank of the Axe. A. formerly was famous for the manufacture of Turkey and Persian carpets, little inferior to those imported. Two celebrated geologists have been connected with A.: Dr. Buckland was born here, and Dr. Conybeare was lord of the manor and vicar. Pop. (1901) 4,100.

AXMOUTH, *aks'mowth:* village at the mouth of the Axe, Devonshire. A mile e. of A. occurred, 1839, a landslip; an area 200 ft. wide, for three-quarters of a mile parallel to the shore, having sunk 250 feet below the sea, with a great noise. The chasm thus formed became a lagoon, while the neighboring sea-bed rose 40 ft. Rather more than a mile further e., occurred another but smaller landslip, 1840. The district around consists of greensand strata.

AXOIDS, n. plu. *aks'oyds* [Gr. *axōn*, an axle, a wheel; *eidos*, resemblance]: a term applied to the curves described by the surface of a cylinder and a plane, when the former rolls on the latter, producing a succession of lines or axes of rotation. AXOIDEAN, a. *ăks-oyd'ĕ-ăn*, of or pertaining to axoids.

AXOLOTL, *ăx'ō-lŏt'l* (Mex., 'play in the water'), a larval salamander regarded as edible. They are numerous in the lakes about the City of Mexico, are 6 to 10 inches long, and are prepared by either roasting or boiling, and eaten with vinegar or cayenne pepper. The most

extraordinary thing about them, however, is the fact that they are the young of a species of terrestrial salamander (*Amblystoma tigrinum*), well known over all the warmer parts of the United States and Mexico, which in these lakes never transform into adults, but remain permanently in the larval condition, yet become sexually mature when about six months old, so that they are able to breed. This astonishing fact was long unknown. The axolotl has bushy, external gills similar to those which permanently characterize the mud-puppy. It was regarded as a distinct animal and named *Siredon lichenoides*. The discovery of the truth was made accidentally in Paris in 1865, when some axolotls in an aquarium in the Jardin des Plantes lost their gills and were transformed into perfected amblystomas. A lady, studying in the University of Freiburg, Frl. Marie von Chauvin, then undertook a series of careful experiments with other captives, and worked out the complete history of metamorphosis, which is dependent (at least in Europe) on a very narrow set of favorable circumstances, but differs in no essential degree from that of other salamanders (q. v.). Why the change never takes place in the Mexican lakes is unexplained. The theories in regard to it, and the detailed history of the observations above mentioned, are given by Gadow in 'Amphibia and Reptiles' (1901), with many references to other books and periodicals.

AXOPHYTE, n. *ăks'ō-fīt* [Gr. *axōn*, a pole or axle-tree; *phuton*, a plant]: in *bot.*, the united stem and root of a plant.

AXOTOMOUS, a. *ăk-sŏt'ŏ-mŭs* [Gr. *axōn*, an axis; *tŏmē*, a cutting; *temno*, I cut]: applied to minerals that can be cleaved in one particular direction.

AXUM, *âk-sôm'*: formerly cap. of an Ethiopian kingdom; now in the modern Abyssinian province of Tigre. It is mainly in ruins. Pop. 2,000. The former greatness of the city is testified by remaining structures cut in granite, some with inscriptions. From these it appears that the Axumite empire extended over Abyssinia, and even over Yemen and Saba in Arabia, and possessed the command of the Red Sea. It acquired political importance from the fact, that it formed on the s. a boundary to the world-embracing power of Rome, as well as to that of Parthia, which then extended as far as Arabia. The Byzantine emperors even paid an annual tribute to the sovereigns of Axum.

AXUNGE, n. *ăk'sŭnj*, or AXUNGEA, *ăk-sŭn'jĭ-ă* [L. *axis*, an axle-tree: *un'gŭō*, I smear]: the hardest and firmest part of the fat of animals; hog's lard.

AY, or AYE, ad. *â'ĭ*, or as pron. I [AS. *gea;* Ger. *ja*, yea, yes]: yea; yes; certainly; indeed; more than that. AYES, n. plu. *â'ĭz*, or *īz*, used in legislative and deliberative bodies, when counting the votes—those voting in favor of a motion are called the AYES, those voting against it are called the NOES, *nōz*. AY, AY, yes, yes; is it so? *Note.*—

Ay is probably only a corruption of *yea*, due to confusion with the interjection *ay!* which possibly is a different word.

AYACUCHO, *ī-â-kô'chō:* town in the dept. of A., s. Peru. Here, 1824, Dec. 9, the combined forces of Peru and Colombia—the latter then comprising Ecuador, New Granada, and Venezuela—totally defeated the last Spanish army that was ever seen on the new continent. Pop. 22,000.

The dept. of A., 24,213 sq. m., is on the e. side of the Andes. Pop. 147,909. See HUAMANGA.

AYAH, n. *ăy'yă* or *ā'yă* [Port. *aya*, a governess]: the name given in India to a native female nurse or waiting-maid.

AYALA, *â-yâ'lâ*, PERO LOPEZ DE, called El Viejo, to distinguish him from his son of the same name: 1332–1407; b. Murcia, of one of the first families of the Castilian nobility. He stood high in the regard of several kings of Castile, and filled the first offices of the state, latterly that of high-chancellor and high-chamberlain of Castile. At the battle of Najera, 1367, he was taken prisoner by the English, then in league with Peter the Cruel, and confined for some time in an English dungeon; and again, 1385, by the Portuguese, at the battle of Aljubarota. He died at Calahorra. A. has repute, not only as a statesman, but also as a writer, especially as historian and poet. His best known work is his *Crónicas de los Reyes de Castilla D. Pedro, D. Enrique II., D. Juan I., D. Enrique III.* (2 vols. Madr. 1779–80—the older editions, 1495 and 1591, are imperfect). He was the first among the Spaniards to give up the usual simple narrative of events in the order of time, and to seek a more rational representation of them according to the rules of historic art. It is only in recent times that the poetical works of A. have been discovered; the most remarkable of which is the *Libro o' Rimado de Palacio*. This 'Book in Rhyme on Court-life,' as its singular title may be translated, was begun during the poet's first captivity in England, and is composed in the old national form of rhyming Alexandrine stanzas of four lines; the contents are satirical and didactic. A. appears in his poetical works as a representative of that transition epoch of Spanish national literature, when it was passing from a popular original literature to one of a more artificial imitative character.

AYE, ad. *ā* [AS. *ava:* L. *ævum*, an age: Icel. *ei*, ever: Gr. *aei* or *aiei*, always]: ever; to eternity.

AYE-AYE, n. *ī'ī* [native name *Hai-Hai*, from the creature's cry *hī, hī*], (*Daubentonia Madagascariensis*): a rare quadruped about the size of a hare, native of Madagascar; at first placed by naturalists among Squirrels, and ranked by Cuvier with them in the order of Rodents (*Rodentia*), although Sonnerat, who discovered it, pointed out its affinity also to the Makis or Lemurs, to which family it is now generally referred. The principal reason for placing the A. among the *Rodents* has been found in the conforma-

tion of its teeth; but the other characters of the animal agree generally with those of the Lemurs, and its habits resemble theirs. The A. has large broad ears, large round eyes, long brownish-gray hair, and a large bushy tail, which it does not carry over its back as squirrels do. It is very active during the night, but sleeps during the day. In confinement, it will subsist on boiled rice and fruits, but its chief natural food is a white insect. The teeth scratch away the bark of trees for insects, and the long claws serve to draw them out. The native name *Hai-Hai* is derived from the creature's cry, *hī, hī* (see *Nature*, xxvi).

AYESHAH, *ā'e-sha* or *ī'e-sha:* the favorite wife of Mohammed, 610 (or 611)—677; b. Medina. She was only nine years of age when she married the Prophet. Her father's name was Abdullah, but he was surnamed Abu-Bekr, 'father of the virgin,' in consequence, it is said, of his daughter being the only one of Mohammed's wives who was a virgin. Although A. bore no children to Mohammed, she was so tenderly beloved by him, that he was wont to say that she would be the first of his wives to whom the gates of Paradise would be opened. It is stated by Mohammedan historians, that to the charms of her beauty she added a knowledge of mathematics, rhetoric, and music; but this statement is improbable. After the Prophet's death, A. was active in the plot which deprived Caliph Othman of his power and life, and headed a force to resist the accession of Ali. After some partial success, however, the troops under her were effectually defeated by Ali, and she was taken prisoner. Ali spared her life, and allowed her to reside in any town in Arabia she chose, provided she did not interfere with state affairs. She died at Medina. In spite of her political adversities, A. was highly venerated by all true Mussulmans, and named the *Prophetess*, and the *Mother of Believers*.

AYLESBURY, *ālz'bėr-i:* ancient town in the centre of Buckinghamshire, on a rivulet which flows into the Thame, an e. branch of the Thames. It was taken from the Britons by the Saxons 571. Until its disfranchisement by the Distribution of Seats Act, 1885, A., with its hundreds, returned two members to parliament. The parish church of St. Mary is a fine early English edifice and there are various other places of worship, a county hall, market-house, clock tower, and corn exchange. There are also baths, a large county hospital, and the only convict prison for women in England. The chief industries are printing, making condensed milk, and poultry-raising for the London market, Aylesbury ducks being widely known, and there are several breweries and flour-mills. Pop. 9,244.

AYLESFORD, *ālz'ford:* village near the centre of Kent, on the right bank of the Medway; 3½ m. n.e. of Maidstone. Remarkable ancient remains are here. On a hill-slope a mile and a half to the n.e., stands a celebrated ancient dolmen, or burying-place, called Kits Coity House—a small

truncated pyramidal chamber, open in front, and formed of four large rude Kentish rag blocks. In this district, on the brow of the chalk-hills on both sides of the Medway, are also large circular sepulchral pits, opening at bottom into one or more chambers. At A. the Britons defeated the Saxons, 455, and drove them from the island; but early in the 7th c. the Saxons were victorious here.

AYL'MER, *āl'mėr*, Matthew, Canadian military officer: b. Melbourne, P. Q., 1842, March 28. He entered the British army in 1864; retired from the imperial service and entered the Canadian volunteer militia in 1870; and became adjutant-general of the Dominion militia, the highest military office in Canada next to that of the major-general commanding, in 1896.

AYLOFFE, *ā'lŏf*, Sir Joseph: English antiquary of celebrity; abt. 1708–81; b. in the parish of Framfield, Sussex. When the new State-Paper Office was established, 1763, he was made one of the commissioners for the preservation of the state papers. In 1772, he published a valuable work on the national records. He projected, and at his death was engaged in the execution of the work, afterwards continued by Gough, and known as Gough's *Sepulchral Monuments*.

AYMAR, *ā'mâr*, Jaques: b. 1662, Sep., at St. Veran; son of a peasant of Dauphiné; brought up as a mason, but he forsook that trade for the divining-rod, which he used at first to point out springs, hidden treasures, etc. In 1692, A. succeeded in discovering one of the guilty parties in a murder and robbery at Lyons: this gave him fame, and he was called to Paris to exhibit his art before the Prince de Condé, but his power of divination utterly failed him; and being forced to confess himself an imposter, he was sent back in disgrace to his original obscurity.

AYMON, *ā-mon* or *ā-mōn':* surname of four brothers, Alard, Richard, Guiscard, and Renaud, sons of Aymon or Haimon, Count of Dordogne, who figure among the most illustrious heroes of the chivalric poetry of the middle ages; but their historic existence is questionable, as the deeds attributed to them are so largely miraculous, and the traditions concerning them so inconsistent. Their career belongs to the cycle of marvels of which Charlemagne is the center, and their adventures were the exclusive subject of some of the romantic narratives of Italy in the 15th and 16th c. A novel, *Les Quatre Fils Aymon*, by Huon de Villeneuve, a French poet of the age of Philippe Auguste, details very minutely their exploits. Finally, Ariosto gave the family a poetical immortality by his *Roland*, in which Renaud, the bravest of the four brothers, plays continually the most distinguished part. While some traditions of them have a Provencal origin, the author or authors of the popular German book which Tieck has edited and published, entitled *The Beautiful and Entertaining History of the Four Brothers Aymon, and of their Horse Bayard, with the Deeds and Heroic Feats that they accomplished against*

the Pagans in the time of Charlemagne, seem to have drawn from a different source. Probably the varieties in the legends are due to the fancy and national predilections of the authors, developing modifications from a single tradition.

AYORA, *â-yō'râ:* town of Spain; province of Valencia; 50 m. s.w. of Valencia. The inhabitants are chiefly employed in husbandry and oil-making. Pop. 5,000.

AYR, *air:* the county town of Ayrshire; on the left bank of the river Ayr, about the middle of the coast of Ayrshire, 40 m. s.s.w. of Glasgow by rail; in a coal district. A. is a clean and handsome town, and its principal streets are well built. To the s., between the town and the race-course, numerous elegant villas have recently sprung up. Three bridges span the river and connect the town with Newton-upon-Ayr—the 'Auld Brig' and the 'New Brig' (taken down 1877, and rebuilt) of Burns, together with a railway bridge. Part of the tower of the old church of St. John, built 12th c., and turned into a fort by Cromwell, is still standing. A harbor is formed by the estuary of the river and is protected by piers and a breakwater. A large wet dock has recently been built. The coasting trade is considerable. Ayr exports manufactured goods, iron, coal, whet-stones, etc.; and imports iron-ore, grain, timber, slates, bricks, etc. Shipbuilding is carried on, also tanning, boot and shoe making, the manufacture of carpets, lace curtains, etc. At an early date, A. was a commercial and military place of some importance. William the Lion made it a royal burgh about 1202. During the Scottish wars of independence, it was a centre of military operations, and, while in possession of an English garrison, was the scene of Wallace's first exploits. The principal objects of interest near A. are connected with the memory of Robert Burns. See Alloway Kirk. A. unites with Campbelton, Irvine, Inveraray, and Oban, in sending a member to parliament.

Water for the city was brought from Loch Finlas, 20 m. distant, in 1887. The municipal and parliamentary burgh are now conterminous and include Wallacetown and Newton. Pop. 28,624.

AYRES, *ärz*, Romeyn Beck: soldier: 1825, Dec. 20—1888, Dec. 4; b. East Creek, Montgomery co., N. Y. He graduated at West Point 1847, and served in Mexico until 1850, and afterward on frontier and garrison duty. He was promoted to capt. 3d artil. 1861, May, and was chief of artil. 6th army corps. He served with the army of the Potomac on the peninsula, at Antietam, Gettysburg, and elsewhere; and was mustered out 1866 as maj. gen. U. S. vols. He was promoted to col. 3d artil. 1879, July 18.

AYRSHIRE, *air'shir:* extensive maritime county in the s.w. of Scotland; bounded, n. by Renfrewshire; w. by the Firth of Clyde and the North Channel; s. by Wigton and Kirkcudbright; e. and n.e. by Dumfries and Lanark. Its greatest length is 78 m.; its greatest breadth, 26—average

14½; 1,149 sq. m., or 735,262 statute acres. It is the 7th. in size of the Scottish counties. The general aspect of the county is undulating and hilly, the land attaining no great elevation, except a small portion in the n., and some considerable tracts in the s. and s.e., which are mountainous. None of the eminences exceed 2,520 ft. A. contains a great number of lakes and small streams, the latter rising near the inland boundary of the county. The chief rivers —only 20 to 35 m. long—are the Ayr, with its tributary the Lugar, and the Doon, which flow across the centre of the county; the Garnock and Irvine in the n.; and the Girvan and Stinchar in the s. A. to the s. of the Girvan consists of Lower Silurian rocks, and to the n. of that river, of patches of Devonian, carboniferous, and trap rocks. It is rich in valuable minerals, especially coal, ironstone, limestone, and freestone. On the banks of the Ayr is found an excellent species of whetstone, called Water-of-Ayr Stone. The climate of A. is mild and healthful, but moist. The soil along the coast is light and sandy, interspersed with deep loam; the most fertile districts are in the centre of the county, where clay predominates. On the e. side are extensive mosses and moorlands. The three ancient divisions of the county are—Carrick, s. of the Doon, mostly wild and hilly; Kyle, between the Doon and the Irvine, containing much rich level land, but towards the coast the soil is light, and, though well cultivated, is less productive; and Cunningham, comprising all the country n. of the Irvine, mostly fertile.

Agriculture in A., till about 1800, was very backward; but since then, especially of late, extraordinary progress has been made in furrow-draining, improved [illegible]n, and road-making; while the condition of the peasants has been much improved. Dairy-husbandry is carried to high perfection in Ayrshire, the breed of milch cows, of which it rears a greater number than any other Scotch county, being noted as the finest in the kingdom for the quantity and quality of their milk. The Dunlop cheese, so called from the parish of that name, is almost as celebrated as Stilton, but is now almost superseded by that made on the Cheddar process. The breed of horses is excellent. Sheep are also bred in great numbers; their wool is coarse and scanty, but the flesh is excellent. Manufactures, especially woolen and cotton, are extensive. At Catrine there are extensive cotton-works; at Kilmarnock, dye-works, iron-foundries, etc.; and at Cumnock, a large pottery. Of the minor manufactures, the most characteristic is that of ornamental woodwork, often bearing tartan designs, which is extensively carried on at Mauchline. Great iron-works are at Muirkirk, Hurlford, Kilwinning, Ardeer, Dalry, and Dalmellington. Maybole manufactures shoes and agricultural implements. There are valuable fisheries on some parts of the coast. Troon, Ardrossan, Ayr, and Irvine are thriving ports. The chief towns, besides Ayr, are Kilmarnock, Girvan, Maybole, Dalry, Kilwinning, Beith, Irvine, Stewarton, Ardrossan, Saltcoats, Troon,

Mauchline, Galston, Newmilns, Kilbirnie, and Largs. Of antiquities, the most interesting are the ruins of Crossraguel Abbey, near Kirkoswald, and of the castles of Turnberry, the family seat of Robert the Bruce, Dunure, Loch Doon, Dean, Auchinleck, Dundonald, etc.; also the ruins of Alloway Kirk.

A. was inhabited, in the time of Agricola, by the Damnii, with whom were afterwards mixed the Scots from the opposite coast of Kintyre. In the 8th c., the Northumbrian Saxons seized the territory; afterwards came the Normans, whose traces still exist in local names. During the religious persecutions of the Stuarts, A. was a stronghold of the Covenanters. A. county returns two members to parliament. Pop. (1891) 226,283; (1901) 254,468.

AYRSTONE, n. *ār'stōn*, a soft variety of whetstone found on the Water of Ayr—called also SNAKE-STONE, from its mottled appearance.

AYTON, *ā'ton*, SIR ROBERT: 1570–1638; b. Kinaldie, Fifeshire: Scottish poet and favorite courtier in the reign of James VI. He took his degree of M.A. 1588, at St. Andrews. From France, 1603, he addressed an elegant panegyric, in Latin verse, to King James, on his accession to the throne of England, which appears to have been the making of A.'s fortune, for he was soon appointed to various positions at court. A. was on terms of familiarity with all the most eminent men of his time—poet, wits, and philosophers alike—among others, Hobbes and Ben Jonson. He was a poet of considerable merit; but many of his effusions being complimentary verses to his friends, are characterized by conceit and extravagant flattery. He was one of the first Scotsmen who wrote in English with elegance and purity. His verses on general topics show something of the refined fancy that characterized Herrick. Burns had a great admiration for some of A.'s pieces, two or three of which he paraphrased. A. is said to have written verses also in Greek, Latin, and French. Several of his Latin poems are preserved in the work called *Deliciæ Poëtarum Scotorum* (Amsterdam, 1637).

AYTOUN, *ā'tôn*, WILLIAM EDMONDSTOUNE: 1813–65, Aug. 4; b. and d. Edinburgh: studied at the Univ. of Edinburgh, and was called to the Scottish bar 1840. In 1845, he was appointed Regius prof. of rhetoric and belles-lettres in the univ.; and, 1852, he was appointed to the shrievalty of Orkney and Shetland. He married a daughter of Professor Wilson. During many years Prof. A. was engaged in literary work. His earliest work known is *The Life and Times of Richard I.* He was a master of caricature and parody; and many of the most successful of the *Bon Gaultier Ballads* are understood to be from his pen. In 1849 he published the *Lays of the Scottish Cavaliers and other Poems*, which established his reputation as a poet of the school of Sir Walter Scott, and which has run through many editions—his finest poetical work. Among his subsequent writings are—*Firmilian, a Spasmodic Tragedy,*

1854; and *Bothwell*, 1856, a narrative poem. His edition of the *Scottish Ballads*, 2 vols., appeared 1858. In 1859, he issued in conjunction with his friend, Mr. Theodore Martin, translations of various minor poems of Goethe. He was for many years one of the most frequent and brilliant contributors to *Blackwood's Magazine*. Prof. A. was distinguished at once as poet and humorist. His poems have a ballad-like simplicity and a fiery flow of narration; while his tales—the best known and appreciated of which are *The Glenmutckin Railway*, and *How I became a Yeoman*—have a certain robust humor and farcical abandonment. As a critic, he took up the knout of the dreaded Christopher North of the 'Noctes.' His life has been written by Theodore Martin (Lond. 1867).

AYUNTAMIENTO, *â-yūn'tâ-mē-ĕn'tō:* councils or governing bodies of towns in Spain. Sprung from the institutions of the Romans, and firmly established during the long struggles with the Moors, the ayuntamientos acquired great influence and political power, the more so that the nobility were not excluded from them. After 1521, their importance began to be impaired, and under the Bourbons it vanished; still the remembrance of it was cherished by the people. Accordingly, the cortes of Cadiz, 1812, took up the leading features of the former system, adapting them, by more democratic modifications, to the requirements of the time. On the return of Ferdinand VII., the ayuntamientos were abolished; they were again restored by the cortes, 1823; and after the invasion by France, once more set aside. During the civil war, various proposals were made regarding the ayuntamientos; but at last the arrangements of 1812 were confirmed by the constitution of 1837. The ayuntamientos were empowered to make up the lists of electors and jurors, to organize the national guard, to command the police within their own bounds, to direct the apportionment and raising of taxes, and to manage the funds of the commune. The law of 1870 deprived them of all political authority, and they are now subject to the cortes, the law courts, etc.

AZALEA, n. *ăz-āl'ĕ-ă* [Gr. *azalĕŏs*, dry, parched—in allusion to the dry habitat of the plants—from *azō*, I dry or parch]: genus of plants, nat. ord. Ericaceæ; distinguished from Rhododendron (q. v.) chiefly by the flowers having five stamens instead of ten. Most of the species of A. also differ from the rhododendrons in having thin deciduous leaves. Some botanists unite the genus *A.* to *Rhododendron*. One of the species best deserving of notice is *A. Pontica*, a shrub from three to five ft. high, native of the countries around the Black Sea with large obovate or oblongo-lanceolate shining leaves and umbellate yellow flowers, externally covered with glutinous hairy glands, and very fragrant. It may be regarded as, like many of the other *Ericeæ* (heaths, etc.), a *social* plant; and its golden flowers give great brilliancy to the landscape in many parts of the Crimea, the s.e. of Poland, the Caucasus, etc. It covers many mountain slopes, but does not ascend to any great

elevations, giving place to the more alpine *Rhododendron Ponticum*. It is common in gardens and shrubberies in Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous, and the honey collected by bees from its flowers, which very much abound in honey, is said to cause stupefaction and delirium, as happened to Xenophon's soldiers in their famous retreat in Asia. N. America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Britain, particularly a. *nudiflora* and a. *viscosa*—the native colors of the first varying from pink or flesh to purple; the other, white to rose—beautiful flowers, of delicious fragrance. a. *viscosa*, the Clammy

Azalea Indica.

or White Swamp Honeysuckle, Me. to Ky., has flowers after leafing, like the Smooth A. of the Alleghany Mts. (*a. arborescens*), whose calyx is long-lobed. *a. nudiflora*, the Purple A. or Pinxter-flower of swamps, Mass. to Ill. and s., is smaller, 2–6 ft. The Flame-colored A. (*a. calendulacea*), native of the s. parts of the United States, is described as frequently clothing the mountains with orange or living flame.—India and China produce several species of A., of which one of the finest is *a. Indica*, well known as a greenhouse shrub. Its flowers have great brilliancy of colors. Many hybrids exist between the more hardy species and this. Another extremely beautiful species is a. *ledifolia*, an evergreen from China.

A diminutive, procumbent, evergreen shrub, native of alpine regions in Europe and N. America, plentiful on high mountains in Scotland, was long known as *A. procumbens*, but is now called *Loiseleuria procumbens*. The flowers are small and rose-colored. The whole appearance of the plant widely differs from that of the genus Azalea.

AZALEINE, n. *a-zā'lĕ-ĭn:* the dye rosanaline.

AZAZEL, n. *ă-zā'zĕl* [Heb. *azazel*—in the opinion of Gesenius, the same as *azalzel*—from *azal* (disused in Heb., but occurring in Arab.), to separate]: a word of uncertain meaning, but probably meaning dismissal or removal—occurring in Lev. xvi. 8, 10, 26; in *Milton*, an evil spirit, standard-bearer to Satan.

AZEDARACH, n. *a-zĕd'a-răk* [Arab., *azadarach*]: in *pharm.*, the bark of the root of a tree, *Melia azedarach*.

AZEGLIO, *âd-zāl-yo*, Mas'simo Marquis d': famous as artist, publicist, romance-writer, and statesman: 1798–1866, Jan. 15; b. Turin, descendant of an ancient and noble family of Piedmont. His early study of music and painting was cut short by his father procuring him an appointment in a Piedmontese cavalry regiment, but illness forced him to quit the service. Soon after 1820, he devoted himself to painting, and in a year made himself a name in Rome. In landscape-painting he soon attained complete artistic skill. He was also a student of history. Removing to Milan, 1830, he began to make himself favorably known also in literature, his novels, *Ettore Fieramosco* (1833), and *Niccolo de' Lapi* (1841), having done much to raise the national spirit of the Italians. The political affairs of Italy soon occupied him exclusively; he traversed the provinces, cities, and villages, seeking to stir up the spirit of patriotism, and to conciliate the unhappy party divisions, and was everywhere received with acclamation. A. never belonged to a secret political society, but opposed conspiracies as mischievous, and exhorted the impatient to moderation. While in Florence, he wrote his famous piece, *Degli ultimi Casi di Romagna*, in which he lashed the papal government, denounced the vain attempts at insurrection, and proved to the Italian princes the necessity of a national policy. After the election of Pius IX. as pope, A. returned to Rome, and to his influence were ascribed the reforms with which Pius began his government. He was intensely active at this time, and wrote much on public questions. (An edition of his political writings, in one volume, appeared at Turin, 1851). When Charles Albert, after the rising of Lombardy, crossed the Ticino, A. left Rome with the papal troops destined to support the Italian contest. In the battle of Vicenza, where he commanded a legion, he was severely wounded in the leg while fighting at the head of his troops. Scarcely was he recovered, when with his pen he courageously opposed the republican party, now intoxicated with victory. On the opening of the Sardinian parliament, he was chosen a member of the chamber of deputies. After the unfortunate event of the battle of Novara, the young king, Vic-

tor Emanuel II., appointed him (1849) president of the cabinet. At the close of the war, 1859, A. was appointed *pro tempore* general and commissioner extraordinary, purely military, for the Roman States. He died 1866, Jan. 15. Since his death, *Political Correspondence,* and other writings from his pen, have been given to the world; and his *Autobiography* has been published by his daughter.

AZERBIJAN, *â-zĕr-bī-jân'*, or ADERBAIJAN, *â-dĕr-bī-jân':* ancient *Media Atropatene;* most northerly province of Persia; between lat. 36° and 40° n., long. 44° and 48° 40′ e.; bounded on the s. by Persian Kurdistan and Irack, e. by Ghilan, n.e. and n. by the Russian territory, and w. by Turkish Uurdistan; about 30,000 sq. m. The surface is very mountainous, many of the ranges rising from 7,000 to 9,000 ft. in height. The peak of Savalan (an extinct volcano) reaches an elevation of 13,000 ft. Mount Ararat rises on the n.w. border. The chief rivers of A. are the Aras or *Araxes,* the Kara Su, and the Kizil-Uzen. The salt lake Urumiyah or Urumieyeh (q.v.), the largest in Persia, is on the w. border of the province. The climate of A. is not unhealthful, but is subject to the extremes of heat and cold. In the mountainous districts, the hail-storms are occasionally so violent as to kill cattle. The principal products of A. are rice, barley, wheat, maize, flax, hemp, cotton, tobacco, honey, and saffron; camels, horses, cattle, and sheep are reared; velvet, silks, stuff, carpets, woolens, and leather are the most important articles of manufacture. Lead, iron, copper, sulphur, saltpetre, and salt are found in the province. The capital of A. is Tabriz, pop. abt. 120,000. It has suffered greatly from earthquakes. The other towns of note are Urumiyah, on the lake of that name; Maragha, famous as the place where Nasir Eddin, the astronomer, fixed his observatory; Miana, Khoi, Selmas, and Ardebil. Pop. of A. 2,000,000.

AZIMABAD, *â-zim-a-bâd'*, or TIROWLI: town of Sirhind, India; on the route from Kurnal to Lodiana; 9 m. n.w. from Kurnal; slightly elevated above the neighboring plain, which is inundated in the rainy season.

AZIMGHUR, *ăz'ĭm-gŭr'*, or AZIM'S FORT: name applied primarily to a town in India; thence extended to its district, forming one of the N.W. Provinces.

The town is in lat. 26° n., long. 83° 14′ e. From Calcutta, it is 448 m. to the n.w.; from Benares, 81 to the n.; from Allahabad, 109 to the n.e.; and from Lucknow, 171 to the s.e. It is on the n.e. Tons, a considerable offset of the Gogra, here crossed by a bridge of boats, and navigable 40 m. below, to its confluence with the Surjoo. During the mutiny of 1857, A. was an exception to the general rule of ruthless cruelty among the insurgents. Pop. (1891) abt. 15,893, besides troops in garrison.

The district stretches in n. lat. between 25° 36′ and 26° 24′; e. long. between 82° 45′ and 84° 12′. The district is low and remarkably level. The soil is fertile, excepting that a few tracts are irreclaimably barren, being impregnated with soda, nitre, and other saline substances. Mag-

nificent crops of rice, sugar-cane, and indigo are produced. The principal manufactures are those of silk and cotton, the value of which amounts to more than £100,000 a year The area is stated at 2,550 sq. m.; the pop. at 1531,410—giving the remarkably high average of 600 persons to the sq. mile.

AZIMUTH, n. *ăz'ĭ-mŭth* [Ar. *al-samt*, a way or path; *assamut*, ways or paths]: in *astron.*, the angle measured along the horizon between the north or south point, and the point where a circle, passing through the zenith and the body, cuts the horizon. It is usual to measure the A. westward from the point most remote from the elevated pole, beginning at 0°, and returning to it at 360°. Thus, in n. latitudes, where the n. pole is elevated, the A. is measured from the s. point, so that the e. point, for instance, has an A. of 270°. See ARMILLARY SPHERE (under ARMILLA). Azimuth circles are those which extend from zenith to nadir, cutting the horizon at right angles, or those in which all the points have the same azimuth. AZIMUTHAL, a. *ăz'ĭ-mŭth'ăl*, pertaining to. AZIMUTH AND ALTITUDE INSTRUMENT, astronomical instrument for ascertaining the altitudes and azimuths of the heavenly bodies at any particular time. It has two axes, the principal one vertical and the other horizontal; the former, therefore, corresponding to a vertical circle of the heavens, and the latter to the celestial horizon. The angles measured on the latter are therefore azimuths or differences of azimuths, and those on the former zenith distances, according as the graduation is from the upper point of the limb, or a point distant from it 90°. AZIMUTH COMPASS, an instrument adapted for observing bearings, consisting of a magnetic bar or needle moving freely in a horizontal plane on a vertical pivot.

AZINCOURT, *ă-zăn-kôr'*, or AGINCOURT, *ă-zhăn-kôr'*: village in the dept. of Pas-de-Calais, France, celebrated for a bloody battle between the English and the French, 1415, Oct. 25. The internal distractions of France under the imbecile Charles VI. (q. v.) had encouraged England to attempt to make good her ancient claims on France. Henry V. of England had landed at Harfleur, had taken that fortress, and wished to march through Picardie to Calais, in order to go into winter-quarters. The Dauphin advanced against him with a powerful force. A great number of the nobility accompanied him; and so great was their confidence, that the offered aid of the Duke of Burgundy and of the city of Paris was rejected. Henry hastened to the Somme, but was followed by the French, who opposed his passage; he at last managed to cross with his army at St. Quentin. Greatly weakened in numbers, and suffering extremely from want of provisions, Henry offered to purchase peace by reparation of injuries. But the French would not hear of a treaty, as they entertained the hope of annihilating the English army. They had, in fact, intercepted the English march to Calais, by taking possession of the high road behind the little river Ternoise, near

the villages of A. and Framecourt. The invading army therefore, still (according to French accounts) 14,000 strong of whom 2,000 were men-at-arms—though no English writer makes it more than 10,000—prepared for an engagement by posting themselves between two woods, in a single line of battle, with the archers on the wings. The French, to the number of 50,000, under the command of the constable, D'Albret, were drawn up in two lines, the men-at-arms, of whom only 2,000 were mounted, being in the first. The English began the onset. The French cavalry rushed forwards to meet them, but were received with such a storm of arrows that they took to flight, threw themselves upon the first line, and put it into disorder. On this, the light-armed English archers took to their bill-hooks and hatchets, broke into the ranks of the men-at-arms that fought on foot, whose heavy armor and close array rendered them almost incapable of resistance, and made the greatest havoc among them. This being followed by a charge of the English horsemen, the first line took to flight, the second was unable to arrest the victors, and the whole French army was soon completely dispersed. The victory was decided. For a moment, Henry believed that the rallying masses were going to renew the fight; and hearing also that a troop of armed peasants were plundering his baggage, he gave orders to slay all the prisoners taken. The order was already executed when he discovered the groundlessness of his alarm. As many as 10,000 Frenchmen were slain, among whom were the constable and six dukes and princes, the Duke of Brabant, the Count of Nevers, the Duke of Alençon, the Duke of Bar and his two brothers. Five princes, among them the Dukes of Orleans and Bourbon, were taken prisoners. The English lost 1,600 killed, including the Duke of York, the king's great-uncle; whom the Duke of Alençon slew. Alençon had even struck the crown from King Henry's head, when he was surrounded by all present, and fell with many wounds. Henry, however, was too weak to pursue his advantage, and therefore continued his march to Calais, where he embarked for England.

AZOBENZOIC, a. *ăz-ō-bĕn-zō″ĭk* [Eng. *azo(te); benzoic*]: pertaining to nitrogen, and also to gum benzoin, a resin produced from *Styrax benzoin*, a tree from the Malay archipelago. AZOBENZOIC ACID, n., in *chem.* $\begin{matrix} NC_6H_4.CO.OH \\ \| \\ NC_6H_4.CO.OH \end{matrix}$ Obtained by the action of sodium amalgam and water on nitro-benzoic acid. A yellow solid, almost insoluble in alcohol, ether, or water; it forms sparingly soluble salts.

AZOIC, a. *ă-zō″ĭk* [Gr. *a*, without; *zōē*, life; *zōtĭkos*, fit for preserving life]: without life; wholly destitute of life. AZOTE, n. *ăz′ōt*, name still retained by French chemists and originally given by Lavoisier to nitrogen gas, which is unable to support life. AZOTIC. n. *ă-zŏt′ĭk*, pertaining to. AZOTIZED, a. *ăz′ō-tīzd*, containing nitrogen or azote.

AZO'IC PERIOD, or AZOIC AGE: see ARCHÆAN PERIOD.

AZOPHOSPHORIC, a. *ăz-ō-fŏs-fŏr'ĭk* [Eng. *azo(te)*; *phosphoric*]: pertaining or relating to azote and phosphorus in combination.

AZORES, *a-zŏrz:* cluster of islands in the Atlantic, 800 m. due w. of the s. half of Portugal; ranging in n. lat. between 36° 55′ and 39° 44′, and in w. long. between 25° 10′ and 31° 16′. In the first half of the 15th c., the A. were discovered by the Portuguese, or rather, it has been said, appropriated by them, after having been revealed to them by a Flemish navigator, Joshua Vanderberg, of Bruges. They were at that time uninhabited—a fact which seems adverse to any notion that America had originally been colonized from Europe in this direction. That the A. were visited by the Carthaginians is proven by Phœnician coins found on Corvo. As early as 1436, they are marked on a map of the world by the Venetian Andrea Bianco. The Portuguese colonists called the whole group A., from *acor* or *azor*, a hawk; and they named two individual islands Corvo and St. Jorgo, from Corvos Marinos and St. Jorsi, which, according to the maps of the 14th c., had been previously seen in the western ocean. In 1466, Alfonso V. made a life-grant of the island of Fayal to his aunt, the Duchess of Burgundy, and this led to a migration thither of many settlers from Flanders. Without reckoning mere rocks, the islands are nine in number. From e. to w. they are as follows: St. Mary, St. Michael, Terceira, Graciosa, St. Jorgo, Pico, Fayal, Flores, and Corvo. Area estimated at 920 sq. m. In the order of population and importance, the islands stand thus: St. Michael, Terceira, Pico, Fayal, St. Jorgo, Flores, Graciosa, St. Mary, and Corvo. The A. form a province of Portugal. Their capital is Angra, in Terceira; but Ponta Delgada and Ribeira Grande, both in St. Michael, are larger towns.

As may be presumed from the density of the population, the soil is fertile, the climate healthful, and the islands are well watered. Exports are oranges, wine, brandy, grain, pulse, pork, beef, cheese, and coarse linens; and imports are woolens, cottons, hardware, iron, glass, cordage, pitch, tar, staves, timber, oil, fish, rum, coffee, sugar, salt, and tea. Perhaps the greatest want of the group is a good harbor. The A. are of volcanic origin—a fact from which may probably be inferred their identity with the Isles of Brazil or of Fire in the maps above mentioned, of the 14th c. Though most of the volcanoes appear to be extinct, the islands contain hot springs, and are subject to violent earthquakes. The coasts are generally steep and rugged, while the interior parts abound in ravines and mountains. The mountains range from 1,869 ft. to 7,613—the latter being the height of the lava-covered *peak* which gives name to *Pico*. Pop. of the group (1890) 255,511; average 292 to a sq. mile; (1900) 256,474.

AZORITE, n. *az-ōr'īt* [from the *Azores* islands]: a white mineral, translucent or opaque, crystallizing in minute octahedrons. The hardness is 7 +; the lustre vitreous on

fracture. It has been proved to be zircon; the minute pyramids implanted on sanidine-trachyte, etc.; some, green.

AZOTINE, *ăz'o-tĭn:* substance procured by decomposing wool by the action of steam at 150° C. under a pressure of five atmospheres: the product, afterwards dried by evaporation, contains nitrogen completely soluble in water. A. is mixed with dried blood for a fertilizer.

AZOTIZED BODIES, *ăz'o-tīzd:* substances which contain azote or nitrogen as one of their constituents, and which form part of the living structure of a plant or animal, or are produced during its natural decay. The principal members of the group are *albumen,* present in white of eggs, and the juices of plants and animals; *globuline,* or *crystalline,* a variety of albumen found in the lens of the eye; *vitelline,* another variety of albumen, composing the greater bulk of the yolk of the egg; *paralbumen,* a third variety of albumen found in the animal system during certain diseases; *fibrine,* abundant in the seeds of cereals and in animal muscle; *caseine* (or cheese matter), present in all milk; *legumine,* a variety of caseine found in peas, beans, and leguminous seeds in general; *gelatine,* present in the skin, bones, and other parts of animals; *chondrine,* a variety of gelatine obtainable from the cornea of the eye and the permanent cartilages; *isinglass,* another variety of gelatine manufactured from the inner membrane of the floating bladder of sturgeons and other fishes; *glue* and *size,* secondary forms of gelatine; *urea, uric acid,* and *hippuric acid,* present in the urine of the higher animals; *kreatine* and *kreatinine,* occurring in the juice of flesh; several forms of *urinary calculi,* found as stones in the bladder; and the very large and important class of *alkaloids,* including strychnine, morphine, quinine, etc. For the principal Azotized Bodies, see their titles: for the use of several of them for food, see Food.

AZOTURIA, n. *ăz'ō-tū'rĭ-ă* [Eng. *azote;* Gr. *ouron;* L. *urīna,* urine]: an excess of urea in the urine; a disease of animals arising from a too rapid disintegration of tissues, or a defective assimilation of food.

AZOTUS, *a-zō'tŭs:* the *Ashdod* of the Old Testament (now Esdud): village on the Mediterranean, 21 m. s. of Jaffa; lat 31° 45′ n., long. 34° 37′ e. It was formerly one of the chief cities of the Philistines, strongly fortified, and the scene of numerous contests between that race and the Jews. Into this city the Ark of the Covenant, captured in war, was brought by the Philistines, and placed in the temple of their god Dagon, whose image fell in pieces before it. In B.C. 8th c. the town fell into the hands of the Assyrians; and in the 7th c. was captured by the Egyptians, after 29 years' blockade and siege. In the wars between Alexander Balas and Demetrius, A. was destroyed by fire. It was afterwards rebuilt by the Romans, but never regained its early importance, and the sea is gradually receding from its harbor. Pop. abt. 300.

AZOV, or Asow, *â-zŏv'* or *ăz'ov:* fortress and port-town in the s. of Russia; on the Don, about 20 m. from its

mouth. The sand and mud deposited by the river have choked up the port so that its trade and shipping have dwindled away, and the inhabitants depend mostly on fishing. A. was anciently a Greek colony, under the name of Tanaïs, and had extensive commerce with the northern peoples. In number of inhabitants and in wealth it often rivalled Panticapæum (now Kertch). In the 13th c. it was taken by the Genoese, who called it Tana. They were driven out of it by Timur (Tamerlane) 1392. In 1471, it was taken by the Turks, and since then has borne the name of A., the Turks calling the town and the neighboring sea Asak. After an obstinate struggle, at which Peter the Great, then beginning his career, was present, it was captured by the Russians about the end of the 17th c. More than once it fell again under the dominion of the Turks, but since 1774 has remained in the possession of Russia. It was bombarded and nearly destroyed by an allied English and French squadron in 1855. Pop. 27,500.

AZOV, Sea of [named after the town]: a large gulf of the Black Sea, formed by the peninsula of Crimea, or rather an inland lake connected with the Black Sea by the long, narrow strait of Kaffa. The Siwash or Putrid Sea is the w. portion of the Sea of A. cut off by the long, narrow slip of low, sandy land called the Tongue of Arabat. The entrance to the Putrid Sea is by the narrow strait of Genitschi at the n. of the Tongue. The Putrid Sea is little but a succession of swamps. The ancient name of the sea of A. was Palus Mæotis. It gets the name of Balik-Denghis, or Fish-sea, from the Turks and Tatars, from its abundance of fish. The water is almost fresh. The whole sea is shallow, and occupies an area of about 14,000 sq. m. During the Crimean war, an expedition, having on board 16,500 English, French, and Turks, was sent to this sea, 1855, May, which devastated the ports, and cut off supplies intended for Sebastopol.

AZRAEL, n. *ăz'ra-ĕl*, or Azrail, *ăz'ra-ĭl* [Arab., Turk., etc.]: the angel of death.

AZTEC, a. n. *ăz'tĕk:* one of the Aztecs, an early race of Mexico, the dominant tribe, inhabiting its great plateaus at the time of the Spanish invasion, and far advanced in the arts and civilization. The Aztec tribe was divided into 20 clans or *calpullis*, each clan occupying several contiguous communal houses, each of which held several hundred persons; besides a clan office building where assemblies were held and strangers entertained. It was governed by an elected council, with a civil and a military head as in Rome, the latter being also constable. Each clan had its special rites, priests, and temple. It was divided into four phratries, each having among other duties that of exacting compensation for murders, and each ward had its own precinct, constituting four wards or quarters of the town, its arsenal, and its captain. These captains were called 'darthouseman,' 'man-slasher,' 'bloodshedder,' and 'chief of the eagle and cactus,' the

latter being chief executioner, and not eligible for the chieftainship of the tribe. The supreme government of the Aztecs was by a council of 20, one from each clan, who must not be a sachem, but a member of the clan council; he was called the 'speaker' and the tribal council the 'speech-place' (parliament, literally). It met every 10 days at least, and oftener if called together. Once in 80 days there was a special session attended by all the leading clan and phratry officials and priests, to reconsider unpopular decisions. The tribe, too, had a dual executive, civil and religious: a sachem who was civil magistrate and chief judge; and a war chief called 'chief of men,' and also some priestly functions, though there was a high priest also. He was originally chief only of the Aztecs; but about 1430 (probably on occasion of the destruction of Azcaputzalco), was made chief of the confederate army. He was elected by the tribal council and the clan war chiefs and leading priests, and could be deposed by them. His official residence was in the tribal office. From the time of the first chief, Acamapichtli, the office remained in a single family, like the old Aryan kingship.

The social and religious organization was a peculiar mixture of the lowest barbarism and the beginnings of civilization. There was no private property in land or dwellings; each man could keep a garden plot for his use, but it was his no longer than he used it. Family life had emerged from savage promiscuity: descent was reckoned in the male line, martial infidelity was punished, and remaining unmarried was not permitted except by special dispensation,—contumacy being punished by being made an outcast, a serf if a man and a prostitute if a woman. Slavery had thus begun in a small way; but the habitual use of prisoners of war as slaves had not, it being preferable to sacrifice and eat them. Agriculture was still primitive; but irrigation was practised to some extent, and horticulture was beginning to develop. The roads were only narrow trails; but they facilitated collection of tribute, and served military and trading purposes as well. The houses were generally of adobe brick, but many of the great pueblos were of stone, so that the towns looked like castellated cities. There were tessellated marble floors, finely worked and colored tapestries, and beautiful feather-work, vases, goblets, and censers of fine marbles and precious metals exquisitely wrought. See MEXICO, *History*.

AZUA, *â-zô'â:* town of the island of San Domingo, not far from the s. coast; on the Bia, and near its mouth, 60 m. w. from St. Domingo. Pop. 6,000.

AZUAGA, *â-thô-â'gâ:* town of Estremadura, Spain; province of Badajos; 20 m. e. from Llerena. Pop. 8,400.

AZULMIC, a. *a-zôl'mĭk* [Eng. *az(ote); ulmic*—from *ulmin*]: nitrogenous and ulmic (humic). See HUMUS.

AZUNI, *âd-zô'nē*, DOMENICO, ALBERTO: 1749, Aug. 3.—1827, Jan.; b. Sassari, island of Sardinia; distinguished jurist, especially in law concerning the maritime relation-

ships of nations. He was judge of the Tribunal of Commerce at Nizza or Nice; and 1795, after that city had been taken by the French, he published a work in which he endeavored to reduce maritime laws to fixed principles, and which, being recast, was published at Paris, 1805, under the title of *Droit Maritime de l'Europe.* The work was sufficiently anti-British in tone to secure its author the favorable consideration of Napoleon, by whom he was appointed commissioner for compiling the maritime portion of the new commercial code. Genoa was annexed to France, and A., 1807, was appointed pres. of the court of appeal there, where he remained until the fall of Napoleon. Among A.'s works are *Essai sur l'Histoire Géographique Politique et Morale de la Sardaigne,* and a *Dictionary of Mercantile Jurisprudence,* and some conversational brochures.

AZURARA, *â-zô-râ'râ,* or ZURARA, *zô-râ-'râ,* GOMEZ DE: a Portuguese historian; 15th c. He was keeper of the archives, and was charged by Alphonso V. to write the history of the kingdom. A tradition attributes to him the destruction of a great number of papers and documents contained in the archives, in 1459, upon the demand of the Cortes, and with the only aim of getting rid of papers considered useless. Fortunately many of the fragments had been copied by different municipalities for administrative uses. The writings of A. are numerous. The most important is a *History of the Discovery and Conquest of Guinea,* reprinted, Paris, 1841; of which a magnificent manuscript is preserved in the Library of Paris.

AZURE, n. *ăsh'ėr* [Fr. *azur:* It. *azurro,* blue—from Pers. *lazur*]: the blue color of the unclouded sky; a blue pigment of a greenish tint; in *heraldry* A. is technically used to signify blue; and in engraving arms it is always represented by horizontal lines: ADJ. a sky-blue; v. to color azure. AZURED, a. *ăzh'ėrd,* being of an azure color. AZURN, a. *azh'ėrn,* blue. AZURINE, n. *ăzh'ū-rĭn,* a fresh-water fish (*Leuciscus cœruleus*)—so named from its color: of the same genus with the roach, chub, etc., and most nearly resembling the Red-eye (q. v.) or Rudd (L. *erythrophthalmus*), from which it is readily distinguished by the slate-blue color of the back, and the whiteness of the abdomen and fins: found in Lancashire, Eng., also in Switzerland. AZURE-STONE, so named from its color; a familiar name for lapis-lazuli. AZURITE, n. *ăz'ū-rīt,* the mineral more commonly called Lazulite (q. v.), and to which, with Lapis Lazuli (q. v.) or *Azure-stone,* mineral turquoise (see TURQUOISE), etc., the generic name *Azure Spar* is sometimes given.—The name A. is given by Dana to the blue copper-carbonate only, which differs from malachite in having more carbon-dioxide and less water. Beautiful crystals occur in the Arizona mines and elsewhere.

AZYGOUS, a. *ăz'ĭ-gŭs* [Gr. *a,* without; *zugon,* a yoke]: in *anat.,* without a fellow or corresponding part.

AZYMITES, n. plu. *ăz'ĭ-mīts* [Gr. *a,* without; *zūmē,*

leaven]: those Christians who use unleavened bread in the Lord's Supper. AZYMOUS, a. *ăz'ĭ-mŭs*, unfermented or unleavened—applied to sea-biscuit. AZYME, un-leavened bread.

AZZARKAL, *âz-zar-kâl':* first half of 11th c.; b. Cordova: Arabian mathematician and astronomer. He was royal astronomer of Al-Mamoun, King of Toledo. He invented divers instruments for making observations, constructed a water-clock of extraordinary dimensions, as well as a planisphere and an astrolabe, upon new principles. The library of the Escurial possesses an Arabic manuscript (No. 967) that contains one hundred astronomic problems and explanations of the instruments of Azzarkal.

AZZI, *ât'sē*, FAUSTINE: 1650–1724; b. Arezzo: Italian poetess. She had the most brilliant renown in her time and country, and most of the academies of Italy admitted her into their membership. Besides fragments scattered in different collections, she has published a vol. of poems under the title of *Serto Poetico* (1694).

AZZO II., *ât'so:* d. 1097; son of Azzo I.: one of the most powerful princes of Italy at his epoch; prominent in the events of which the peninsula was the theatre. He had possession at one time of the earldom of Maine, in France.

AZZUBEYDI, *âz'zoo-bā-dē*, MOHAMMED IBEN EL HASAN: 927–989; b. Seville: Arabian lexicographer. He was cadi of Seville and preceptor of Hischeam, son and heir of the sultan. He wrote an abridgment of the great biography of the Spanish grammarians, by Khalil; a treatise on grammar, and a work upon the character of the syntax in the Arabic language.

B.

B, or b, *bē:* second letter of the English alphabet, and a consonant: the second letter also in the Hebrew or Phœnician alphabet, and in all alphabets derived from it. It belongs to the order of labials, and is of the kind called medial or flat. See LETTERS: ALPHABET. Its name in Hebrew is *beth,* signifying 'house,' probably because its original hieroglyphic or picture form was an outline of a house or tent. In the corresponding words of sister-languages, we find *b* very generally replaced by some one of the other labial letters [*p, f* (*ph*), *v*]; these substitutions, however, take place not by chance or caprice, but according to ascertained laws. See PHILOLOGY, COMPARATIVE: GRIMM'S LAW. The following are examples of the interchange of *b* with other letters: Corresponding to Eng. *bear* are Skr. *bhri,* Lat. *ferre,* Gr. *pherein:* Eng. *be,* Skr. *bhu,* Lat. *fio* and *fui,* Gr. *phuo:* Eng. *bore,* Lat. *forare:* Eng. *of* and *off,* Gr. *apo,* Lat. *ab:* Eng. *wife,* plural *wives,* Ger. *weib,* Old H. Ger. *wip:* Eng. *web, weave, weft:* Gr. *episcopos,* Eng. *bishop,* Fr. *evêque.* In several Latin words, *b* arose out of *u* (pronounced like *v* or *w*). Thus, the original form of *bellum,* war, was *duellum* or *dvellum;* of *bonus, dvonus;* and the *d* being dropped (as we drop the sound of *k* in *knee*), the *v* became hardened into *b.* Similarly, *bis,* twice, is or *duis.* A remarkable interchange sometimes takes place between *b* and *m,* as in Skr. *mri,* to die; Lat. *mort-,* death; and Gr. *brotos,* mortal.

The Greeks pronounced their *b* (β) like a *v,* for they spelled *Virgilius,* e.g., *Birgilios;* and this continues in modern Greek. In Latin, during the classical ages at least, the letter was pronounced as it is in English, French, etc. But in the time of the later emperors (beginning with the 3d c. after Christ), *b* was softened down, in the popular language at least, to a slovenly sound like *v;* for in inscriptions of this period, such spelling as *verva* for *verba, miravili* for *mirabili,* are quite common. The distinction between the two sounds being once lost sight of, the letter *b* was frequently substituted for *v*—as *berba* for *verba, bivus* for *vivus.* This softening of *b* into *v* in the middle-age Latin has left traces in the modern Italian and French; as Lat. *habere,* Ital. *avere,* Fr. *avoir;* Lat. *tabula,* Ital. *tavola.* A Spaniard, on the contrary, has a tendency to use *b* instead of *v;* thus he pronounces *vivere* like *bibere,* and *Jovis* as if written *Jobis.*

B, in Music, is the seventh degree of the diatonic scale of C. and the twelfth degree of the diatonic-chromatic scale. In harmony, it is called the major seventh. Ac-

cording to the tempered system of tuning, the ratio of B to the fundamental note C is $\frac{8}{15}$. In the ancient diatonic scale, B was never used as a key-note, as its fifth, F, was imperfect. In the German notation, B is called H, while B-flat is called simply B. B-flat is a half-tone lower than B, and in harmony is called the flat seventh. As a harmonic arising from C, B-flat, as produced by nature, is considerably flatter than in the tempered system of tuning.

BA: in *chem.*, the symbol of the element barium.

BAA, n. *bâ* or *bā* [imitation of cry]: the bleat or cry of a sheep: V. to bleat or cry as a sheep. BAA'ING, imp. BAAED, pp. *bâd* or *bād*.

BAAL, n. *bā'ăl* [Ar. *the idol:* Heb. *lord*]; BA'ALIM, n. plu. *bā'ăl-ĭm:* Hebrew word signifying *lord, owner,* or *master,* and applied as a general title of honor to many different gods. In Hosea ii. 16, it is mentioned as a name which had been given to Jehovah himself; but when used with the definite article, it specially designated the principal male deity of the Phœnicians and Carthaginians, as Baaltis or Astarte was the principal female deity. In connection with Babylon and Assyria, the same deity is spoken of under the name of Bel or Belus. Originally, B. was the god representing the sun as the ruler of nature and the type of its productive powers, and Astarte was the goddess

Fig. 1.—Baal, or Melkart.

From a copper coin of Cossyra in the British Museum.
(Twice the size of the original.)

of the moon. In the later star-worship of the western Asiatic nations, B. was the name of Jupiter, the planet of fate, or, as some suppose, of Saturn. The proper Phœnician name of B., however, was Melkart, Melkrat, or Melchrat, which is usually supposed to mean 'king of the city'—i.e., Tyre; but others consider it a contraction of two words signifying 'king of the earth;' while the learned Selden is of the opinion that it is equivalent to 'strong king.' B. was perhaps the same god as the Phœnician Moloch. The Greeks confounded B. or Melkart with their own Hercules; and for the purpose of distinction, termed him the Tyrian Hercules. From the earliest foundation of Tyre,

he seems to have been the tutelar god of that city, and his worship apparently extended thence until it was prevalent in all the towns of the Phœnician confederation, and was established in their remotest colonies, such as Malta, Carthage, and Cadiz. It also overspread the neighboring countries of Assyria and Egypt. Each country or locality had its B. or chief god. According to Scripture, the temples of this idol (at least in Phœnicia and Assyria) were built on the top of hills, or still more frequently in solemn groves, and sometimes altars were erected to him on the roofs of houses. His priests were numerous. Incense was the most frequent offering presented to him, but we read also of sacrifices of bullocks, and even of children. In 1 Kings, xviii., we read that the priests of B. danced about the altar during the sacrifice, and barbarously cut and mangled themselves, if their god did not speedily answer their prayers.

The word B. enters into the composition of many Hebrew, Chaldee, Phœnician, and Carthaginian names, such as Jezebel, Hasdrubal ('Help of Baal'), Hannibal ('Grace of Baal'), Ethbaal ('With Baal'), Baal-bec ('City of Baal'). The word is also frequently found in conjunction with some epithet, and in such cases appears to have denoted a different deity, though it may have been the same person regarded in another aspect, and as exercising merely a different function. Thus, we have Baal-Berith, the 'Covenant Lord,' who was specially worshipped by the people of Shechem; Baal-Peor, the *Priapus* of the Moabites and Midianites; and Beelzebub, or Baalzebub (the Fly-god), the idol of the Philistines at Ekron, where he had a temple.—The Celtic deity Beal is usually identified with Baal.

BAALBEK, *bâl-bĕk* [*City of Baal*, the Sun-god]: ruined city in the ancient Cœle-Syria; by the Greeks, during the Seleucide dynasty, called Heliopolis; lat. 34° 1′30″ n., long. 36° 11′ e. It is in the plain of Bukâ'a, 'at the n. extremity of a low range of bleak hills, about one mile from the base of Antilebanon,' in a well-watered and delightful region, rather more than 40 m. n.w. of Damascus. Once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments, it is now famous only for the splendor of its ruins, of which three deserve special notice. The most imposing is that of the great Temple of the Sun, a rectangular building, 290 ft. by 160, having its roof supported by a peristyle of 54 Corinthian columns, '19 at each side, and 10 at each end.' Of these, six yet stand. The circumference of these columns is about 22 ft., and the length of the shaft 58; with pedestal, capital, and entablature, they measure about 89 ft. in height. The approach to this temple was through two spacious courts. South from the great temple is a smaller one, known as the Temple of Jupiter, similar in form, having its peristyle and the walls of its cella still mostly standing. It is 227 ft. in length, by 117 ft. in breadth, being larger than the Parthenon at Athens. Both temples, as well as the surrounding structures, are built of limestone, in a richly decorated,

somewhat fantastic Corinthian style. Besides these, there stands at the distance of 300 yds. from the others a circular building, supported on six granite columns; style, mixed Ionic and Corinthian. It was once used as a Christian church.

The early history of B. is involved in darkness; but it is [illegible] that from the most distant times, it had been a chief seat of sun-worship, as its name implies. Julius Cæsar made it a Roman colony, and under Augustus it was occupied by a Roman garrison. Antoninus Pius (A. D. 138–161) built the great temple, which the legend current among the modern inhabitants counts a work of Solomon. When Christianity, under Constantine, became the dominant religion, the temple became a Christian church. In the wars that followed the taking of the city by the Arabs, who sacked it 748, the temple was turned into a fortress, the battlements of which are yet visible. The city was completely pillaged by Timur Bey, or Beg, 1400. What the Arabs, Tatars, and Turks had spared was destroyed by an earthquake, 1759. B. is now an insignificant village; pop. a few hundred. See Wood and Dawkins' *Ruins of Baalbec* (1757); Cassas', *Voyage Pittoresque de la Syrie* (1799); Murray's *Handbook for Travellers in Syria and Palestine;* Baedeker's *Syria and Palestine* (1875).

BABA, *bâ'bâ:* Turkish word signifying *father*, originating, like our word *papa*, in the first efforts of children to speak. In Persia and Turkey, it is prefixed as a title of honor to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons, as Ali-Baba.

BA'BA, Cape: bold, rocky headland near the w. extremity of Anatolia—the Lectum of the Greeks—lat. 39° 29′ n., long. 26° 4′ e.; about 12 m. from the n. extremity of Mitylene, the ancient Lesbos. On a shelving point of the cape stands the town of Baba, pop. abt. 4,000, where there is some trade in superior cutlery. The once large and prosperous, now utterly ruined, city of Assos, mentioned by the apostle Paul, is in the vicinity.

BABATAG, *bâ-bâ-tâg'*, or Baba Dag, *bâ-bâ-dâg':* city in the Roumanian Dobrudscha, 2½ m. w. of Lake Razim; in a marshy district. It has a high school and five mosques, of which that built by Bajazet I. is the finest. Bajazet founded the city, which he peopled with Tatars, and named after a saint, whose monument, on a hill near by, is resorted to as a place of pilgrimage. Through the port of Kara-Kerman, a short way to the s., the inhabitants of B. carry on a considerable commerce with the Black Sea. Pop. 10,000.

BABBAGE, *băb'ĭj*, Charles: 1792, Dec. 26—1871, Oct. 18; b. near Teignmouth, Eng.; took his degree of B.A. at Trinity Coll., Cambridge, 1814; and was prof. of mathematics for 11 years from 1828. B. united in happy combi-

nation powers of invention and observation with thorough scientific culture. In 1834, he published his extremely correct and well-arranged *Tables of Logarithms.* He was the first to make the method of constructing such tables the object of earnest study. The difficulty of securing accuracy in preparing large tables led him to attempt to make a machine to do the work (see CALCULATING MACHINE). A result of his inspection of manufacturing establishments was his noted work, *On the Economy of Manufactures and Machinery* (Lond. 1832), in which all processes are classified. He published also: *Comparative View of the Different Life-Assurance Societies; Differential and Integral Calculus; Decline of Science* (1830); *The Exposition of* 1851 (1851); *Passages from the Life of a Philosopher* (1864); and papers in the *Transactions* of the Royal Socs. of London and Edinburgh.

BAB'BITT METAL (see ALLOY): anti-friction alloy mostly tin, with a little antimony and copper, constituting a soft metal for use in bearings, as axle-boxes. It was invented 1839 by Isaac Babbitt (1799–1862), of Mass., who was awarded a gold medal by the Mass. Charitable Mechanics' Assoc., and $20,000 by Congress.

BABBLE, v. *băb'bl* [F. *babiller,* to prattle: Dut. *babbel,* babbling; *babbelen,* to chatter: Icel. *babbla,* to babble]: to talk idly; to utter words imperfectly, as children; to tell secrets: N. senseless talk. BAB'BLER, n. *-blėr,* an idle talker. BAB'BLING, imp.: N. foolish talk. BABBLED, pp *băb'bld.* BAB'BLEMENT, n. the act of babbling; the foolish talk.—SYN. of 'babble, v.': to chatter, prattle; prate.

BABE, n. *bāb,* or BABY, n. *bā'bĭ* [W. *baban;* F. *poupée;* It. *bambino,* a babe: Dut. *poppe,* a bunch of flax, a doll: L. *pupa,* a doll]: a very young child of either sex; an infant. BABISH, a. *bā'bĭsh,* or BABYISH, a. *bā'bĭ-ĭsh,* resembling a baby; childish. BA'BISHLY, ad. *-lĭ,* or BABYISHLY, ad. *bā'bĭ-ĭsh-lĭ.* BA'BISHNESS, n. or BABYISM, n. *bā'bĭ-ĭzm,* the characteristic quality of a baby; state of being babyish; extreme childishness. BA'BYHOOD, n. the state or condition of being a baby.

BABEL, n. *bā'bĕl* [Heb.]: the place where the confusion of languages took place, mentioned in Scripture; confused unintelligible speech arising from many speaking loudly at the same time. BABEL-QUARTZ, a variety of rock-crystal.

BABEL, *bā'bĕl,* TOWER OF: the building in Babylonia, the scene of the confusion of tongues recorded in Gen. xi. The distinction of being a remnant of the Tower of B. has been claimed for three different masses: 1st, for Nimrud's Tower at Akkerkuf; 2d, the Mujellibe, 950 yds. e. of the Euphrates, and five m. above the modern town of Hillah; 3d, the Birs Nimrud, to the w. of that river, and about six miles to the s.w. of Hillah—all in Babylonia (q. v.). The last of these has a majority of opinions in its favor. It is oblong in shape, total circumference about 762 yds. At the e. side it is cloven by a deep furrow, and is not more than 50 or 60 ft. high; but on the w. side it rises in a

conical figure to the elevation of 198 ft.; and on its summit is a solid pile of brick 37 ft. high by 28 in breadth, diminishing in thickness to the top, which is broken and irregular, and rent by a large fissure through a third of its height. It is perforated by small square holes, disposed in rhomboids. The fire-burnt bricks of which it is built have inscriptions on them; and so excellent is the cement, which appears to be lime-mortar, that it is nearly impossible to extract a brick whole. The other parts of the summit of this hill are occupied by immense fragments of brickwork, of no determinate figure, tumbled together, and converted into solid vitrified masses, as if they had undergone the action of the fiercest fire, or had been blown up with gunpowder, the layers of brick being perfectly discernible. These ruins stand on a prodigious mound, the whole of which is itself in ruins, channelled by the weather, and strewed with fragments of black stone, sandstone, and marble. The legend of the building of B. has been found among the Assyrian tablets in the British Museum.

BAB-EL-MANDEB, *băb'ĕl-mân'dĕb* [i.e. 'the Gate of Tears']: the strait between Arabia and the continent of Africa, by which the Red Sea is connected with the Gulf of Aden and the Indian Ocean; so called from the danger arising to small vessels from strong currents. The Arabian peninsula here throws out a cape, bearing the same name as the strait, rising to the height of 865 ft. About 20 m. from this cape stands the wall-like coast of Africa, rising in Ras Sejan to the height of 380 ft. Within the straits, but nearer to Arabia, lies the bare, rocky island of Perim (q. v.), now occupied by the English as a fort; the strait on the e. side of this island is called the Little Strait, and that on the w. the Great Strait. The depth of the former varies from 8 to 12 fathoms; that of the latter reaches 185 fathoms. The first is usually chosen by vessels on account of its affording good anchorage. Close to the African coast lie eight small islands, called the Eight Brothers.

BABER, or Babur, *bâ-bėr* (Zehir-Eddin Mohammed): first of the Great Moguls in India, a descendant of Timur: 1482–1530. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in the sovereignty of the countries between Samarkand and the Indus. Gradually he made himself master, by fraud and force, of the provinces of Kashgar, Kundez, Kandahar, and Cabul. Having thus opened the way to India, he made two or three rapid incursions into Hindustan; and finally taking advantage of the feeble government of Ibrahim Lodi, about the end of 1525, he crossed the Attock (the Cabul branch of the Indus), quickly defeated some bodies of troops that opposed him in the Punjab; and at last, 1526, April, on the plain of Panipat, not far from Delphi, encountered and fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1,000 elephants of Sultan Ibrahim were dispersed; Ibrahim himself fled; and B. made his entry into Delhi. In the

following month, Agra, the second city of the empire, surrendered. B.'s enjoyment of empire in India was short; and during the five years of his reign he had to contend with numerous conspiracies and revolts. B. had a taste for science and art. He wrote, in the Tatar language, the history of his own life and conquests, translated into Persian by Abdul Rachim, and more recently from the Persian into English. This founder of the B., or Great Mogul, dynasty was succeeded on the throne of Delhi by Humayun, eldest of his four sons.

BABEUF, *bȧ'bŭf*, FRANÇOIS NOEL (generally known by the name of 'Caius Gracchus,' which he affixed to his political articles), 1764–1797, May 24; b. St. Quentin, dept of Aisne, France. French revolutionist. In his journal, established Paris, 1794, July, *The Tribune of the People*, he preached the sovereignty of the masses, urging a new distribution of the land, the abolition of every political order, the equality of all individuals, and community of property. His violent language caused him to be imprisoned. On this release, he attached himself to the members of the extreme Jacobin party, which had just been overthrown. A secret conspiracy was formed, the aim of which was the destruction of the Directory, and the complete re-establishment of the democratic constitution of 1793, which had been suspended during the Reign of Terror. The plot was discovered through the treachery of one of the members. With other chiefs, B, was seized; and when brought to trial he overwhelmed his judges with abuse. He was of course condemned to death, and was guillotined on the following day.

BABINGTON, *băb'ĭng-tŏn*, ANTONY: d. 1586, Sep. 20; English gentleman of the county of Derby, head of a conspiracy in favor of Mary Stuart of Scotland. The rivalry between Queen Mary and Queen Elizabeth of England was at the same time a contest between Rom. Catholicism and Protestantism. Accordingly, the various plots for rescuing Mary from the power of her enemy wore the same character, and have been misrepresented and judged of according to the ecclesiastical prejudices of each historian. B., young, rich, a zealous Rom. Catholic, and on that account already an enthusiastic admirer of the unfortunate Mary, was induced, through the agents of a determined conspirator, Morgan, who had been arrested in France at the instance of the English court, to put himself at the head of a plot that had for its object the murder of Queen Elizabeth, and the rescue of Mary. The execution of the murder was undertaken by one Savage, in which he was to be assisted by a number of the Rom. Cath. nobility, as circumstances might require. The day of action was fixed for 1586, Aug. 24. B. reserved the deliverance of Mary for his own share, entered into correspondence with her, and received letters purporting to be from her in return, approving of the assassination of Elizabeth. The secretary, Walsingham, not only had all the threads of the plot in his hands, but also contributed, through his emissaries, to

spur on the conspirators. When the right moment was come, B. and his accomplices were arrested, and condemned. B. made no denial, acknowledged the letters to Mary to be his, and laid his head on the block. Savage, Barnwell, Bollard, Abington, Tichburne, and Tilnec, had a like fate. Mary Stuart herself had, four months later, to ascend the bloody scaffold; and her condemnation was justified chiefly on the ground of those letters received by B. Mary, however, denied to the last moment that the letters were written by her hand, or with her knowledge; and her friends constantly maintained that they were the work of Walsingham himself, in order that the unhappy queen might be put to death with a show of justice. The rest of Walsingham's conduct in this affair, as well as his habit and mode of supporting Elizabeth's views in general, give high probability to the accusation.

BABINGTONITE, n. *băb'ĭng-tŏn-īt'* [after *Dr. Babington*]: a mineral (Ca,Fe,Mn,SiO_3) classed between the pyroxene and amphibole groups; crystals small, resembling black augite.

BABOO, rather BABU, n. *bā'bô* [Hind, a child, a prince, a master]: a title of respect among Bengalees; any respectable Bengalee; a Hindoo clerk.

BABOON, n. *bă-bôn'* [Dut. *baviaan;* OE. *baber-lipped,* from its large lips: F. *babouin,* a monkey—from *babines,* the large lips of a beast], (*Cynocephalus*): genus of the Monkey family, or *Simiadæ* (see MONKEY); distinguished from all the rest of that family by the very elongated muzzle, which terminates abruptly, and is pierced with nostrils at the end like that of a dog. The face has, indeed, a general resemblance to the face of a dog. The dentition agrees with that of the other apes or monkeys of the old world, to which the baboons are entirely confined, being distinguished only by the remarkable strength of the canine teeth. Baboons, like almost all the Monkey family in the old world, have callosities upon the buttocks; and, like the greater part of them, they have cheek-pouches. The tail of some of the species is of considerable length, that of others is a mere tubercle, with an erect tuft of hairs. The physiognomy of all baboons is repulsive, and indicates the fierceness which strongly characterizes them, and in which they differ from monkeys in general; some of the larger ones are dreaded by the inhabitants of the countries in which they are found, though in reality, they rarely attack human beings. Their fore and hind legs are so proportioned, that they walk easily, and run swiftly on the ground; but, like all other quadrumanous animals, they climb trees and rocks with great agility. Their hair is long, forming a sort of mane on the upper parts. All of them are very susceptible of cold, and they seldom live when removed from their native tropical countries. They feed chiefly on fruits and roots: some of them inhabit barren and stony places where scorpions abound, which they seize, adroitly deprive of the

sting, and devour. They are very cunning, mischievous, and revengeful; troops of them sometimes enter a plantation, not merely to plunder, but apparently to amuse themselves by destroying whatever they can find; they seem, however, always to have some appointed to keep watch, and they make off with great rapidity on the first signal of alarm. When plundering, they cram their cheek-pouches before they begin to eat. These cheek-pouches are very capacious: a B., kept in confinement, has been seen to put eight eggs into them at once, and then to take out the eggs one by one, to break them at the end, and deliberately to suck their contents. The larger baboons are sometimes hunted by dogs where they have not trees to take refuge in; but a single dog, however powerful, cannot safely attack them; a baboon will seize a dog by the hind legs, and whirl him round and round till he is stupefied. Baboons are not so easily domesticated as many kinds of monkey; however, they are not quite incapable of it when taken young.

As examples of baboons with tails of considerable length, may be mentioned the Chacma, or Pig-faced B., also called the Ursine B. (C. *porcarius*), native of south Africa; and, the Dog-faced B. (*C. Hamadryas*), native of Arabia, Persia, and the mountains of Abyssinia. The latter species, perhaps the only one known to the ancients, is often sculptured on the ancient monuments of Egypt, and is supposed to have been the species of monkey to which divine honors were paid. Its body was frequently embalmed, and B. mummies are still found.—The Chacma is one of the largest of the baboons, about the size of an English mastiff, and very much stronger: it is common on the mountains of the Cape Colony, and in troops would be very formidable; but they usually scamper out of the way, instead of attacking travellers, unless they are provoked. It is of a dark-brown color, with long shaggy hair. The tail is rather more than half the length of the body, and is terminated by a tuft of long black hair.

The short-tailed, or almost tailless, baboons far exceed their longer-tailed congeners in ugliness. Only two species are certainly known—the Mandrill or Rib-nose B. (*C. Mormon*), and the Drill (*C. leucophæus*), both natives of Guinea. The mandrill is the largest, fiercest, and most powerful of the whole genus. The colors of its fur are very fine, of a light olive brown above, and silvery gray beneath; but besides other things unpleasant to the sight, its face is peculiarly hideous; the cheek-bones in the adult males being enormously swollen, so that the cheeks are protuberant to the size of a man's fist upon each side, and ribbed with blue, scarlet, and purple. In their native forests, mandrills generally live in large troops, and are said to put to flight every other wild beast.

BABY: see BABE.

BABYLON.

BABYLON, *băb'ĭ-lon*—BABYLONIA, *băb-ĭ-lo'nĭ-a*: anciently the flat country about the lower course of the Euphrates, called in modern times Irak-Arabi. In the Old Test. it is called Shinar, Babel, and also 'land of the Chaldees;' and by the later Greek and Roman writers, occasionally Chaldæa. Its proper boundaries were: on the n., towards Mesopotamia, the Euphrates and the Median Wall, which extended from the junction of the Chabur with the Euphrates to the Tigris; on the e., towards Assyria and Susiana, the Tigris; on the s., the Gulf of Persia; and on the w., the desert of Arabia. During the wider extension of the Babylonian dominion, the name comprehended also Assyria and Mesopotamia. The country forms a perfect plain, a continuation of that of Assyria. The two rivers, Euphrates and Tigris, here approach each other most nearly, until their blended waters fall into the Persian Gulf. The country was anciently protected from flooding by numerous canals and embankments, and several artificial lakes, now mostly in ruin. The most important canal was that now known as Nahr-el-Melik, undoubtedly the ancient royal canal that joined the two great rivers. It was kept in repair by the Roman emperors, and was serviceable as late as the 7th c. The soil, naturally fertile, was rendered more so by the garden-like way in which it was cultivated, and yielded abundant crops, especially of wheat, barley, and dates. The want of stone and wood was felt more severely than in Assyria. The only building material was brick, for which the soil afforded abundance of clay. The bricks were either dried in the sun or burnt, and were very durable, resisting, in the ruins, the effects of the weather to this day. Mineral bitumen, springing up everywhere in abundance, served as mortar. In this favored plain, the human race attained its earliest state of social and political organization.

Until recently, the earlier history of Babylonia was doubtful. The only sources were a few incidental notices in the Bible; some frgaments derived at third hand from the perished writings of Berosus, a Babylonian priest, who had translated the annals of his country into Greek; and lastly, the notices of Greek writers, chiefly Herodotus. All was confused and contradictory, and history and mythology were jumbled together.

But in recent years, multitudes of brick tablets, stamped with cuneiform (see CUNEIFORM) characters, have been dug up from the ruins of the great cities that once studded the banks of the Tigris and Euphrates; and on these contemporaneous records of events reaching back 30 centuries before the Christian era, and restoring a lost page of human history.

At the earliest period to which the records reach, the population of the whole valley of the Tigris and Euphrates consisted mainly of tribes of Turanian origin, their language having remarkable affinities with those of the Ural-Altaic group of the Turanian nations, e.g., the Finns, the Magyars, and Turks. Closely allied tribes occupied the

whole region s.w. of the Caspian Sea—Media, Armenia, Elam, Susiana. In that region lies Ararat, the 'Mountain of the World;' and to that region the traditions of those Turanians pointed as the cradle of their race. But the earliest records reveal the existence of a Semitic element in the population of the Euphrates valley, coming in apparently from the s.w.—Arabia and Egypt. The infiltration of this foreign element went on increasing for centuries, until at last it got the upper hand, and the Babylonians and Assyrians, when they became known to the historians of the West, were essentially Semitic peoples. Their civilization, however, was merely a development of what they took up from the original inhabitants.

The dominant people in Babylonia in the earliest times were the Accad, or Accadians. They had come originally from the mountains of Elam, e. of the Tigris, and hence their name Accad, which means 'highlanders.' They brought with them the art of cuneiform writing, as well as other arts and sciences, especially astronomy. It is in the Turanian language of these Accadians that the cuneiform inscriptions of Babylonia are written for many centuries. And when the Semitic tongue had become predominant, Accadian, now a dead language, was to the Assyrians what Latin has been to the nations of modern Europe: Assyrian scholars translated the Accadian literature into their own language, and their technical and sacred terms were borrowed from it. Every day is bringing to light new proofs of the influence of these Accadians upon the civilization of the Semitic nations, and through them upon that of Europe. Greece, it is well known, derived its system of weights and measures from the Babylonian standards; but these have been proved to be of Accadian origin. The Greek *mina* or *mna*, the fundamental unit of the Greek monetary system, is the *maneh* of Carchemish, and *maneh* is found to be not a Semitic but an Accadian word, showing the origin of the system. The sexagesimal division of the circle; the signs of the zodiac; a week of seven days, named as we now name them, and the seventh a day of rest, are all Accadian. Every large city had its public library. In the royal library of a Babylonian monarch, Sargon (abt. B.C. 2000), every tablet was numbered, so that the reader had only to write down the number of the tablet he wanted, and it was handed to him by the librarian. Among the multifarious subjects of this extensive literature are hymns to the gods strikingly like the Hebrew psalms; and in a long mythological poem there is an episode giving an account of the Deluge resembling that of Genesis. See ASSYRIA. The Accad religion was originally a Shamanism (q.v.), similar to what still prevails among the Turanian tribes of Siberia; but it gradually developed into a huge system of polytheism, which was adopted and modified by the Semitic inhabitants. The Accadians were great in magic, and the Greek *magos*, a magician, is derived from an Accadian word equivalent to 'reverend.'

BABYLON.

The city of Babylon was not the first seat of power. The earliest records yet discovered are those of a monarch whose capital was Ur (now Mugheir). Art was already far advanced, and the extent of the monarch's resources is seen in the ruins of the temple of the sun-god built by him; it is calculated that 30,000,000 bricks must have been used in its construction. Centuries, apparently, after this, a fresh invasion from Elam is recorded, to which the exact date can be assigned of B.C. 2280. Another Elamite conqueror, named Cudur-mabug, extended his sovereignty over Palestine; and it is inferred that a sovereign of this dynasty is the Chedorlaomer of Genesis (the name in Accad would be *Kudurlagameri*, 'worshipper of the god Lagamaru'). Some time after this the seat of power was finally fixed at Babylon, and the Semitic tongue began to supersede the Accadian.

The cities in the n. division of the country had been founded by colonists from the s., and were long ruled as dependencies of Babylonia. At length they grew into the independent kingdom of Assyria; and B.C. 14th c. an Assyrian monarch captured Babylon. From that time the position of the s. state became more and more subordinate to the n., and finally it sank into a province. Babylonia, however, was not always a submissive vassal. Under the leadership of Chaldæan chiefs, it made many struggles for independence. The Chaldæans are first heard of B.C. 9th c. as a small Accadian tribe on the Persian Gulf; but they became so prominent in these struggles that they latterly gave their name to the whole province of Babylonia, which came to be styled Chaldæa. The name of one of those Chaldæan chiefs, Merodach-Baladan, occurs both in Scripture and in the inscriptions. From the former, we know that this king sent a message to Hezekiah, King of Judah, ostensibly to inquire about his recovery, probably with a view to an alliance against Assyria; and from the latter, that Merodach was expelled by Sargon, King of Assyria, that he made a fresh attempt to recover his throne, and was finally dethroned by Sennacherib. The complete subjection of B. to Assyria at this time (B.C. 680) is proved also from the Scripture account, which states that Esarhaddon, son of Sennacherib, reigned in Babylon. About fifty years afterwards, Nabopolassar, governor of B. for the Assyrian king, proved faithless to his trust, and entered into an alliance with the Median king, Cyaxares, for the overthrow of the ruling state. See ASSYRIA. This undertaking was successful, and B. now (B.C. 625) became, though it was but for a short time, an independent and conquering power. The son of Nabopolassar, Nebuchadnezzar II., next defeated the Egyptian king, Necho, at Circesium (Karchemish), on the Euphrates (B.C. 604), and thus annihilated the Egyptian dominion in Asia. He then subdued Jehoiakim, King of Judah; and in consequence of repeated revolts, destroyed Jerusalem, and put an end to the kingdom of Judah under Zedekiah (B.C. 588), carrying the inhabitants captive to Babylon. The Phœnicians submitted to him voluntarily, with the exception of Tyre, which underwent an obstinate siege without yield-

ing. After a fortunate expedition against Egypt, Nebuchadnezzar turned his attention to the adornment of his capital; and the greater part at least of those buildings usually ascribed to a very early period, and especially to the mythical Semiramis, belong to him. After his death (B.C. 562), the Neo-Babylonian empire fell to pieces as suddenly as it had sprung up, and under Nabonedus (Nabunita, in the cuneiform inscriptions, and in Herodotus, Labynetos), who had entered into an alliance with Crœsus of Lydia, against Persia, it came under the dominion of Cyrus (B.C. 539). The Belshazzar of Scripture is thought to be the son of Labynetos, to whom was confided the defense of B. while the elder prince held Borsippa. From this time B. appears on the Persian monuments as a Persian satrapy, under the name of Babirus.

With the overthrow of the Persian monarchy, B. came under the short-lived dominion of Alexander the Great, who died in that city (B.C. 323). Seleucus I., to whom B. had been promised at the conference of Triparadisus, contested and won the possession of it from Antigonus (B.C. 312). About B.C. 140, it was taken from the Syrian monarchs by the Parthians. It came into the hands of the Romans only temporarily, first under Trajan (A.D. 114), under Septimius Severus (199), and again under Julian (363). When, in 650, the successors of Mohammed put an end to the new Persian monarchy of the Sassanides, the province of B., where Bagdad was built (762–766), became the seat of the caliphs till 1258. Since 1638, when the Turks, for the second time, took it from the Persians, it has been under the dominion of Turkey, divided into the pachalics of Bagdad and Basra.

The classic writers represent the civilization of the ancient Babylonians as of a high stamp. The government was despotic, of a kind to suit a crowded, luxurious, and effeminate population. Arts and commerce were flourishing—the last was carried on by caravans with Bactria, Persia, and Media, perhaps as far as India, and by shipping on the Persian Gulf with Arabia. B. was famous for its dyes, its cloths, and embroideries, especially for the manufacture of rich carpets with inwoven figures of strange animals and arabesques, such as we yet see on the Nineveh sculptures. The general prosperity was such, that B. and Assyria together were able to pay to Persia, in the time of Darius Hystaspes, a yearly tribute of 1,000 talents (upwards of $1,400,000)—a sum greater than that contributed by any other province.

The Babylonians were notorious for their effeminacy, luxury, and licentiousness. Their religion was nearly allied to that of the Phœnicians. The essential part of it was the worship of the powers of nature, as they are manifested in the larger heavenly bodies and in the fertility of the earth. At the head of their system of belief stood Baal (see BAAL), reverenced through the whole of Mesopotamia and Canaan, who represented, in a general way, the power of nature, without having any moral significance, and was specially identified with the sun. With him stood, as

feminine complement, the goddess Baaltis, the receptive Earth, with whose worship all manner of licentious rites were associated. She makes her appearance principally as Melyta or Mylitta—i e., 'the causer of generation.' How nearly she is related to Ashtaroth (among the Greeks, Astarte), whose functions are so similar, it is not easy to determine. Education and religion were in the hands of the caste of the Chaldees, who occupied themselves at the same time with astronomy and astrology, and kept records, from the earliest times, of their astronomical observations, associating with them the chronicles of their kings. Their scientific acquirements must have been considerable. Engraved cylinders and gems, and the remains of their pottery, testify to their progress in these departments of arts and their architecture, according to the testimony of the ancients and the ruins still remaining, deserves to be ranked high.

Apart from canals, bridges, embankments, and sluices, the interest on the subject of Babylonian architecture is concentrated in the ruins of the capital, BABYLON. The accounts that we find in the ancients of the origin, the greatness, and the structure of the city are exceedingly confused. The god Belus is named as its founder, and also Queen Semiramis; how we are to understand the two statements is not explained. Semiramis, according to the account of Diodorus, employed on it two millions of workmen, collected from all parts of her dominions. With the capital of the older kingdom, the accounts of the ancients known to us have, for the most part, nothing to do; they are all to be referred to the resuscitated and adorned residence of Nebuchadnezzar. Herodotus gives a description of the city, apparently from his own observation. It stood on both sides of the river, in the form of a square, the length of whose sides is variously given; by Herodotus it is stated at 120 stadia, making the whole circumference 60 m. It must be remembered, however, that the walls, like those of most oriental towns, inclosed rather populous districts than cities, so that the whole mass of the population might easily find shelter within the space enclosed. It was surrounded by a wall 200 cubits high, and 50 cubits thick, and furnished with 100 brazen gates—the last number is raised by Diodorus to 250. The city was built with extreme regularity, with broad straight streets crossing one another at right angles; and the two parts were connected by a roofed bridge built of hewn stones, fastened together with iron clamps. Of this bridge not a trace has yet been discovered. The western part of the city is undoubtedly the older, belonging to the early and properly Babylonian dynasty. Here stood, in the middle of the city, as it is described, the famous temple of Belus or Baal, called by the Arabs, Birs Nimrúd. See BABEL, TOWER OF. The next important point on the w. side is the mass of ruins called Mujellibe, probably the royal citadel of the old Babylonian monarchy. On the e. side of the river stood the buildings of the Neo-Babylonian period, among which the 'Hanging Gardens' of Semiramis are to be singled out

as one of the wonders of the world. Of these gardens, Diodorus has left us a detailed description. Their ruins may be recognized in the mound called El-Kasr. The city suffered greatly from the Persian conquest. When it revolted under Darius I., and, after a siege of two years, was recaptured through the ingenuity of Zopyrus, the outer walls were demolished. Xerxes plundered the temple of Belus, which had hitherto been spared, and Herodotus found it empty. Although the Persian kings made B. their residence, nothing was done for the restoration of the city; and Alexander the Great, who, on his entrance, B.C. 331, had promised the inhabitants to rebuild the ruined temple, was unable even to clear away the rubbish, although he employed 10,000 workmen for two months. After his death in the palace of Nebuchadnezzar, and the foundation of Seleucia on the Tigris by Seleucus, Nicator, B. went rapidly to decay. This was partly owing to the new city's being built of the materials of the old, and partly to the want of durable materials for monumental buildings. Stones of any size had to be brought from the mountains of Armenia; their place was mostly supplied by burned brick. As early as the time of Pausanias, there was little to be seen but the ruins of the walls. The older Arabian geographers know, indeed, of a village, Bâbil, but speak more of the great masses of ruins. Since the time of Della Valle, who erroneously looked upon the ruin Mujellibe as the tower of Belus (in which he is followed by Rennel), the site of B. has been the object of many travels and researches. The greater number of the explorers, among whom Rich is the most distinguished, consider the town of Hillah, with 7,000 inhabitants, as the representative of the ancient Babylon. The great masses of ruins, from which we must not, with Rennel, exclude the Birs Nimrúd, embrace, indeed, an enormous extent, but agree perfectly with the accounts of the ancients in being arranged in the form of a square.

Through the discovery in modern times of ancient Babylonian tablets inscribed with cuneiform characters, and the interpretation of the writings by European and American scholars, we obtain clearer insight into the life of the ancient masters of Babylonia, their science, religion, laws, poetry, mythology, and history, than was had by Greek and Roman writers who stood 20 centuries nearer to them than we. Of the tablets discovered many date from more than 2000 years B.C., and of these a large proportion are evidently the work of private persons, and not public records—a fact which shows that the art of writing was in use for other than public ends; and the same inference, with regard to the diffusion of a knowledge of the written language, is suggested by the considerable libraries or collections of inscribed tablets found in the temples. In some of these collections are found tablets that show the student how to ask for the works he requires: all the tablets were numbered and arranged in order in their proper sections. One library, that in the temple of Ea at Eridhu (the sacred city of the god Ea), was a repertory of works on the magic art. Here was discov-

ered a series of tablets called the 'books of spells relating to diseases of the head'—a collection which, according to Lenormant, bears close resemblance to the Atharvaveda (Black Veda) of the Hindus. A Babylonian collection of hymns to the gods has been compared by the same author to the Rig-Veda; in expression and feeling these hymns strikingly resemble the Hebrew psalms. Thus one of the hymns has these verses: 'My god, my creator, take thou mine hands. Guide thou the breath of my mouth; guide thou mine hands; O lord of light.' Another has: 'In heaven, who is high? Thou alone, thou art high. In earth, who is high? Thou alone, thou art high. As for thee, thy word in heaven is declared; the gods bow their faces to the ground. As for thee, thy word in earth is declared; the spirits of earth kiss the ground.' Or: 'O Lord, my transgressions are many: great are my sins. The Lord in the anger of his heart hath confounded me.' We possess intact two of the mythological poems that constituted the great epic (in 12 books) of Gizdhubar. In one of the two (the 11th lay or book of the epic) is told the story of the Deluge, agreeing with the Mosaic narrative not only in details, but even in phraseology. The Noah of this version is Tam-zi, 'the son of life;' his ark rests on a mountain in Nisir, s.w. from Lake Urumiyeh. The other poem (6th of the 12 lays of the epic) describes the descent of the goddess Istar into Hades in pursuit of her dead husband Du-zi (the Babylonian Adonis). We have fragments of other lays that recall the Biblical narratives of the tower of Babel, the creation, the fall, sacrifice of Isaac, etc. Of poems not belonging to the epic by far the most remarkable as a work of poetic art is one that tells of the war in heaven between Merodach, champion of the gods, and the demon Tiamat.

See Rawlinson, *Five Great Monarchies;* Maspero, *The Dawn of Civilization, The Struggle of Nations,* and the *Passing of the Empires;* Rogers, *A History of Babylonia and Assyria;* Hilprecht, *Explorations in Bible Lands during the 19th Century;* Sayce, *History of the Babylonian and Egyptian Religion.* Kaulen, *Assyrien und Babylonien nach den Neuesten Entdeckungen* (1899); *Die Keilinschriften und das Alte Testament;* Harper (editor), *Assyrian and Babylonian Literature* (1901).

BABYLONIAN, a. *băb′ĭ-lō′nĭ-ăn,* BAB′YLO′NISH, a., or BABYLONIC, a. *băb′ĭ-lŏn′ĭk,* of or relating to Babylon; mixed or confused. BAB′YLO′NISH, a., in *fig. lang.*, outlandish; barbaric; ostentatiously grand, but in bad taste; Babel-like, marked by confusion of tongues: (often improperly used for Babylonian).

BABYLONIAN CAPTIVITY, *băb-ĭ-lō′nĭ-ăn:* the transfer of the tribe of Judah to Babylon, after the capture of Jerusalem by King Nebuchadnezzar. In the despotic policy of the East in ancient times, it was a rule to remove the rich and leading inhabitants of a conquered province to

a distant part of the empire, where they were separated by nationality, language, customs, and religion from the great body of the population, and thus rendered politically harmless; while the people that remained behind were deprived of leaders. The inhabitants of Judea underwent oftener than once a deportation of this kind, after they came into conflict with the powerful kingdom of Assyria. Thus, the kingdom of Israel was destroyed under King Hosea (B.C. 722), by the Assyrian monarch Salmanassar, who, after taking the capital, Samaria, carried the principal inhabitatants into captivity in Assyria, and brought stranger tribes into the land of Israel in their stead; these, with the Israelites that remained, formed afterwards the mixed nation of the Samaritans. The most remarkable exile, however, befell the tribe of Judah under Nebuchadnezzar, and consisted of two deportations, B.C. 598 and 588. Zedekiah, King of Judah, warned in vain by the prophet Jeremiah, allied himself with the king of Egypt against the sovereignty of Babylon. Nebuchadnezzar soon appeared with a powerful army before Jerusalem, which he took (B.C. 588). He put out King Zedekiah's eyes, and carried him and the principal inhabitants captive to Babylon. It is this Captivity, the duration of which is usually reckoned at 70 years, though that number is only approximate, that is called, by way of distinction, 'the Babylonian Captivity.' The situation of the exiles was in other respects tolerable. Most of them settled down and acquired property, and even riches: many were called to court, and even raised to high offices in the state. They were allowed to retain their organization by families, and lived by themselves essentially according to the Mosaic law. They had also their own chief, and were allowed the free exercise of their religion. Nor did they want consolation and encouragement; for Ezekiel raised among them his powerful prophetic voice, and the idea of the Messiah became more clearly developed. When Cyrus overthrew the Babylonian empire (B.C. 538), he allowed the Jews to return to their own country. Only the tribes of Judah, Benjamin, and Levi availed themselves of the permission, the other ten tribes disappear from history after the Captivity. It is probable that they had become so mingled with the Babylonians, a people of kindred origin, that they had lost attachment to the country of their race. Vain attempts have, in recent times, been made to discover the ten lost tribes. Some learned men have sought for them in China and India, while some have declared the Afghans to be their descendants, others the North American Indians; and a few have even thought them to be the Anglo-Saxons. One of the more probable conjectures, perhaps, is, that they were the ancestors of the Nestorians in the mountains of Kurdistan.

BABYLONICS, n. pl. *băb-ĭ-lŏn'ĭks:* English designation generally given to a valuable fragment of universal history prior to B.C. 267, composed by Berosus, a priest of Babylon.

BABYROUSSA, or BABIROUSSA, n. *băb'ĭ-rôs'ă* [Malay, *bâbi*, a hog; *rŭsa*, deer], (*Sus Babirussa*): species of Hog (q. v.) inhabiting the forests of Java and the Molucca Islands, remarkable for the extraordinary tusks of the upper jaw, which rise like horns through the bone and integu-

Babyroussa (*Babirussa alfurus*).

ments, are long, somewhat slender, and curved backwards, their use being probably similar to that of horns. The animal is sometimes called the Horned Hog. Its limbs are much more slender than those of the common hog.

BACCA, n. *băk'ka* [L.]: a berry; in *bot.*, during the time before Linnæus, a berry; any fleshy fruit; *now* (*more precisely*), a many-celled, many-seeded, indehiscent pulpy fruit in which at maturity the seeds lose their attachment, and become scattered throughout the pulp. BACCA-SICCA, n. *băk'ka-sĭk'ka* [L.—*lit.*, a dry berry]: in Prof. Link's arrangement, a fruit which, when unripe is fleshy, but which when ripe becomes dry, when it is distinguishable from a capsule only by not being brown. BACCATE, a. *băk'kāt* [L. *baccātus*, furnished with berries—from *bacca*, a berry]: resembling berries. BACCATED, a. *băk'kā-tĕd*, having many berries; in *Johnson*, set with pearls. BACCIFEROUS, a. *băk-sĭf'ĕr-ŭs* [L. *fero*, I produce] producing berries. BACCIVOROUS, a. *băk-sĭv'ŏ-rŭs* [L. *voro*, I devour]: berry-eating.

BACCALAUREATE, n. *băk-ka-law'rĕ-āt* [mid. L. *baccalaureus*. The general opinion is that *baccalaureate* is compounded of L. *bacca*, a berry; *laureatus*, crowned with laurel—from *laurea*, the laurel or bay tree; the reason, according to Calepinus, being—on doubtful historical authority—that students, on gaining the B.A. degree, were crowned with a garland of laurel or bay berries. In L. Lat. *baccalarius*, the original word from which *baccalaureus* may have sprung, was unconnected with *bacca*, a berry, and signified a tenant of a kind of farm in the south of France and the north of Spain called *baccalaria*. Such tenants were bound to give a certain amount of labor to their feudal lord. Wedgwood thinks the word may have had a Basque origin]: in *univ.*, the degree of Bachelor of Arts. BACCALAUREATE SERMON, n., in American colleges a farewell sermon, preached to students on the Sunday preceding their day of graduation. BACCALAUREUS, n. *băk-ka-law'-*

rē-ŭs, one who has taken the first degree in a university; a Bachelor of Arts. See BACHELOR.

BACCARAT, *băk-ka-râ'* [F. etymology unknown]: game of cards played by any number of betters and a banker, with one or more packs of cards: it is the game of cards most usual in France. As a game of pure chance it is, outside of France at least, a 'gambler's game,' and in England it is treated as 'unlawful.' At B. a stake is laid by each better, and the banker duplicates all stakes, dealing then to each player and himself 2 cards. The question is to decide each individual bet by comparing the total count of each better with the count held by the banker. When a player's count is 9 he declares it, and then all of the betters who hold hands superior to the banker's win their bets, and the banker takes the stakes of the rest.

BACCHA, n. *băk'ka* [Gr. *Bakche,* a mythological name]: genus of dipterous insects belonging to the family *Syrphidæ.*

BACCHANAL, n. *băk'kă-năl,* or BACCHANALIAN, n. *băk'kŏ-nā'lĭ-ăn* [L. *bacchanālis,* devoted to Bacchus—from *Bacchus,* the heathen god of drinking and feasting]: one who indulges to excess in intoxicating drinks; one engaged in noisy and drunken revels: ADJ. riotous; pertaining to revelling and drinking. BAC'CHANALS, n. plu. *-năl̈z,* or BAC'CHANA'LIA, n. plu. *-nā'lĭ-ă,* drunken feasts; ancient feasts in honor of Bacchus; seasons of frightful indecency and excess; sometimes called Dionysia. See BACCHUS. BACCHIC, a. *băk'kĭk,* jovial; drunken. BACCHANT, n. *băk-kănt',* one in a state of drunken frenzy. BACCHANTE, n. fem. *băk-kănt',* a priestess or female votary of Bacchus. BACCHANTES, n. plu. *băk-kăn'tēz,* the persons, chiefly women, who took part in the festivals of Bacchus.

BACCHARIDEÆ, n. plu. *băk-ka-rĭd'ē-ē:* a family of shrubs and herbs belonging to the order *Compositæ,* first sub-order *Tubuliflorœ,* and the third tribe *Aeteroideœ.* BACCHARIS, n. *băk'ka-rĭs* [Gr. *bakkaris*—from the Lydian language; a plant yielding oil]: Plowman's spikenard. Genus of *baccharideœ.* Above 200 species are known, all of which belong to the w. hemisphere. They are herbs, shrubs, and sometimes small trees, many of them resinous and glossy. *B. microcephala* is used in Parana for curing rheumatism, and *B. genistilloides* in Brazil in intermittent fever.

BACCHIGLIONÉ, *bâk-kēl-yo'nā:* a river of n. Italy, having its source in the Alps, and its outlet in the Adriatic. It passes through the town of Vicenza, where it is crossed by a fine bridge of nine arches; flows through the plain of Padua, and enters the Adriatic about 3 m. s. of Chioggia. Its whole course is about 90 m., and it is navigable by large boats from Vicenza to the sea.

BACCHIUS, n. *băk-kī'ŭs* [L. *bacchius*—from Gr. *bakcheios*]: in *pros.,* a foot consisting of three syllables, the first and second long, and the third short, as pē ¦ jō ¦ ră; or, according to others, the first short and the second and third long, as că ¦ rī ¦ nās.

BACCHUS.

BACCHUS, *băk'kŭs:* the god of wine (called in Greek Bakchos, Dionysos, and also, especially in the Mysteries, Iakchos); son of Zeus and Semele, the daughter of Cadmus. Before his birth, Semele fell a victim to the insidious counsels of the jealous Here, who induced her to petition Zeus to visit her in his proper form and majesty—i. e., attended with thunder and lightning. The mother was of course consumed, but the six-months'-old B. was saved by being enclosed for some time in the thigh of Zeus. He was first consigned to the care of Ino, the sister of Semele, and her husband Athamas, but when Ino and Athamas were driven mad by Here, Zeus caused him to be carried to Nysa, in Thrace, and then given in charge to the Nymphs. It was here that B. taught the cultivation of the vine, and prepared intoxicating drink from the grapes. In order to impart his discovery to mankind, or, as some say, because Here smote him with madness, he wandered through many countries attended by the Nymphs, who were crowned with

Bacchus.

ivy and vine-leaves, and bore in their hands the *thyrsus*, a pole bound round with leaves and fruit. This expedition, according to a later form of the myth, extended to Bactria and Media, to Egypt and India, where B. is said to have erected pillars as the eastern boundary of the world. Wherever he came in his wide progress, there is a Nysa to be found. The worship of the god, which came originally from the East, and was introduced into Greece by Melampus, was thus spread over nearly the whole known earth, and at the same time the myth of B. was variously modified among the different peoples, so that it has become one of the most perplexed and difficult. B. was, besides, the protector of fruit trees and fruits. The god naturally received many surnames; for instance, Lenæos, from the wine-vat (*lenos*); Bromius, from shouting (*bromos*); Euios (in Latin, Evius), from the exclamation *Euoi*, etc. The mythical march or expedition, above spoken of, was suggested to the fancy by the Bacchanalian festivals, at which Bacchantes roved about in feigned madness, and made midnight processions to the mountains by torchlight. The legend was, that B. met with

much opposition on his expeditions, many refusing to acknowledge his divinity. Thus, Lycurgus, King of the Edones, opposed him, and Pentheus of Thebes, who was on that account torn to pieces by his own mother and her sisters. The daughters of Mynias (q.v.), who refused to celebrate his festivals, were punished by him with madness andsmetamorphosis. As he was crossing to Naxos, the Tyrrhenian sailors wished to carry him off to Italy, and, with this view, bound him; but the chains fell off, vines and ivy entwined the ship, and held it fast in the middle of the sea. B. changed himself into a lion, and the sailors from terror leaped into the sea, where they were transformed into dolphins. Those, on the contrary, who received him with hospitality and reverence were rewarded; such as Midas (q.v.). In general, the character of B. is mild. In works of art, his type is that of a youth inclining to effeminacy. His peculiar ornament is the fillet. The long blond hair is bound up in a knot behind, and only a few locks fall down on both sides over the shoulders; the hair is surrounded by a twig of vine or of ivy. His figure is neither stout nor slim. He is usually represented quite naked; sometimes with a wide robe negligently thrown over, which either covers a part of the shoulders and thighs, or, though more rarely, enwraps the greater part of the body. Frequently, a deer-skin hangs across the breast; at times, he wears shoes, more rarely buskins. From this, the properly Grecian B., the bearded or Indian B. is completely distinct. This last appears in a more dignified, lofty, regal form; he is clad in a tunic reaching to the feet, over which he wears a wide and splendid mantle. As a warrior he wears a short tunic girded round the waist, with buskins on the feet; a panther's skin serves him for a shield. In addition, he is to be seen at times with horns. After the institution of the Eleusinian Mysteries, the service of B. was conjoined with these; accordingly Pindar makes him the companion of Demeter. As the followers of Orpheus held him to be also Apollo, he is associated with the Delphic oracle.

The worship of B. consisted in noisy rites. Thebes, in Bæotia, held to be the birthplace of the god, was considered the chief seat of those rites in Greece. In Athens, the worship of the Lenæan B. was the most ancient, and may be traced back to ante-historic times. The chief offerings made to him were goats and oxen; the last, because he himself was conceived and represented under the form of an ox. The Bacchic festivals deserving special notice are—1. The Attic Dionysia, of which the minor, or country Dionysia, were celebrated in the country in the month Poseideon, at the time of the grape-gathering. Among the characteristic amusements of the occasion were the Askolia, which consisted in smearing full wine-skins (*askoi*) with oil, on which the young peasants attempted to leap with one foot, and by their frequent falls produced merriment. There were also dramatic entertainments. This festival was held probably at the approach of the wine-harvest, and that of the Haloa at its close. These were followed, in the month Gamelion, by the festival of the Lenæa, peculiar to the city of Athens.

The festivities on the occasion, besides theatrical representations, consisted in a great banquet, for which the state provided the meat, and in a procession through the city, attended with the jesting and raillery usual at Bacchic ceremonies. After the Lenæa came the Anthesteria, on the 11th, 12th, and 13th of the month Anthesterion, when the new wine was first drunk. On the second day of this festival, the chief solemnity consisted in a great public dinner, at which the guests, crowned with flowers, and to the music of trumpets, entered into regular contests in drinking, and in a private sacrifice for the prosperity of the state offered by the 'king's archon's' wife, who was at the same time symbolically married to the god. On the third day, a sacrifice was offered to the Chthonian Hermes and to the souls of the dead. Last came the Great Dionysia, celebrated in the month Elaphebolion, and at which new come-

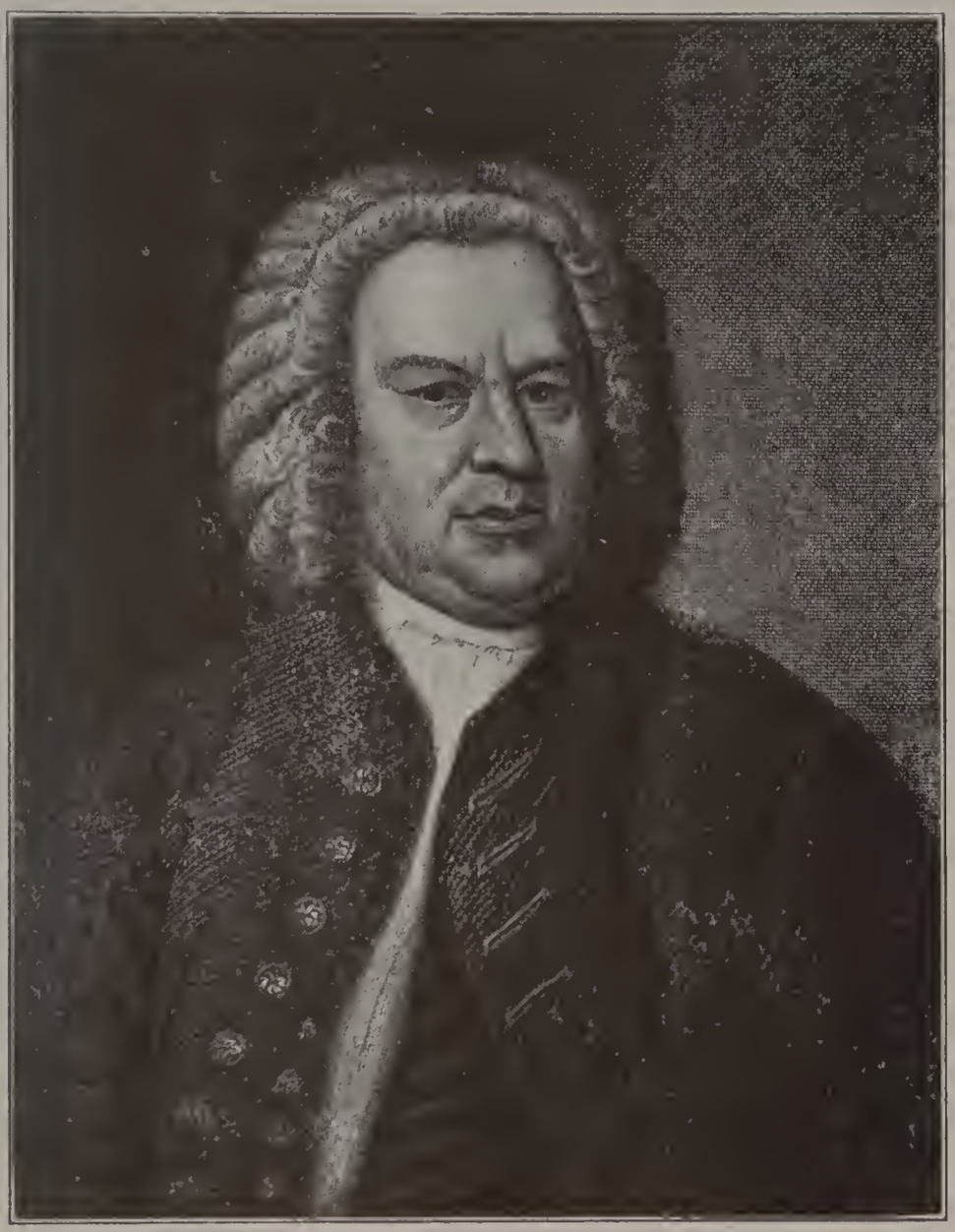
Bacchant.

dies and tragedies were represented. 2. The Triateric Dionysia, which was celebrated every third year in the middle of winter. The performers were women and girls (called in Greek, *Mænades;* in Latin, *Bacchæ* or *Bacchantes*), and the orgies were held at night, on the mountains, with blazing torches and the wildest enthusiasm. This mystic solemnity came from Thrace, and its institution is referred to Orpheus. When it was adopted in Greece cannot be exactly determined. It is earliest met with in Bæotia, particularly at Thebes, where the Cithæron was the scene of celebration. An important place in connection with it is also Parnassus, on the highest summit of which the women of Attica and Delphi celebrated nocturnal orgies in honor of B. and Apollo. The Mænades or Bacchantes were clad on the occasion in fawn-skins, swung about the 'thyrsus,' made a great noise with clapping of hands, and danced

wildly with streaming hair. In this ecstatic solemnity, the god himself was represented by the victim sacred to him, the ox, which the Mænades in their fury tore to pieces. In the most ancient times, even human sacrifices were not uncommon. Descriptions of these wild and terrible rites are not unfrequent in the poets. 3. The Bacchanalia of later times, the foundation of which was laid in Athens, during the Peloponnesian war, by the introduction of foreign rites. From Greece they were carried to Italy. As early as B.C. 496, the Greek worship of B. was introduced at Rome with that of Ceres; and Ceres, Liber, and Libera were worshipped in a common temple. In honor of these deities, the Liberalia were celebrated, March 17, and were of a yet simpler and ruder kind than the great Dionysia of Athens. Afterwards, however, these rites degenerated, and came to be celebrated with a licentiousness that threatened the destruction of public morality and society itself. They were made the occasion of the most unnatural excesses. At first, only women took part in these mysterious Bacchic rites, but latterly men were also admitted. When the evil had reached its greatest height, the government (B.C. 186) instituted an inquiry into it, and rooted out the Bacchanalia with the greatest severity. This was the occasion of the well-known *Senatûs Consultum de Bacchanalibus.* Mention of them, however, occurs at a later period under the emperors.

BACCIO DELLA PORTA, *bât'cho dĕl-lâ pōr'tâ* (better known by the name of Fra Bartolommeo di San Marco): 1469–1517; b. Savignano, Tuscany: one of the most distinguished masters of the Florentine school of painting. His first teacher was Cosimo Roselli; but he owed his higher cultivation to the study of the works of Leonardo da Vinci. His subject are mostly religious, and by far the greater part of his pieces belong to the latter years of his life. He was a warm adherent of that bold reformer of church and state, Savonarola (q.v.), after whose tragical end he, 1500, took the habit of the cloister, and for a considerable time renounced art. The visit of the young Raphael to Florence, 1504, seems to have been instrumental in stimulating him to return to art. He imparted to Raphael his knowledge of coloring, and acquired from him a more perfect knowledge of perspective. The two remained constant friends—B., on one occasion, finishing certain of Raphael's unfinished works, Raphael performing a like kindness for him at another time. B. died at Florence. The greater number of his works are at Florence, in the gallery of the Pitti Palace.

BACH, *bâk*, Baron ALEXANDER: Austrian statesman; born 1813, Jan. 4, at Loosdorf, Lower Austria, where his father held a judicial office. At the age of 24, he entered the imperial service, and during nine years travelled over Europe and in Asia. He was on terms of friendship with the members of the opposition of Lower Austria, and belonged to that circle of young men who understood the failings of the old Austrian system, and the inevitability of a change. At the revolutionary period, 1848, March,



BACH.

B. acted as mediator. He formed part of the Provisional Committee of the Commons, and was chosen in April, by the states of Lower Austria, one of their representatives in the Central Commission of the Provincial States of Austria.

In his political career, from the outset, B. advocated the centralization of the Austrian monarchy, and opposed the independence of Hungary, as well as the entry of the German provinces of Austria into the German confederation. But he desired an extension of the basis of the states, and of their parliamentary influence in the direction of public affairs. During the occurrences of 1848, May 15, B. kept away from Vienna; but when the old liberal opposition came to the helm, B. undertook the ministry of justice, entering with energy into the remodelling of the system of Austrian law. His course incurred the hatred of the 'left,' and of the democratic party generally; and he was bitterly opposed in his advocacy of the principle of compensation in the removal of the burdens of peasant proprietors, and in his policy regarding Hungary. In the events of 1848, Oct. 6, B. would have fallen a victim to popular fury, like the war-minister Latour, had he not withdrawn from pursuit. On the formation of the Schwartzenberg-Stadion ministry, he again took the portfolio of justice, and on the withdrawal of Stadion, 1849, May, B. took his place at the head of the ministry of the interior; from which he was sent, 1859, as plenipotentiary to Rome—a mission which ended 1865.

BACH, Johann Sebastian: celebrated musician: 1685, March 21—1750, Jul. 28; b. Eisenach, Upper Saxony. At the age of nine he lost his father, the 'town-musician' of Eisenach, and sought the protection of an elder brother, on whose death in 1698 B. was again left destitute, and, to earn a livelihood, entered the choir of St. Michael's, Lüneburg, as a soprano singer. In 1703, he became court-musician at Weimar, in 1704 organist at Arnstadt, in 1707 at Mühlhausen. His reputation in this capacity soon spread, and in 1708 he was appointed court-organist at Weimar, by the reigning duke. While holding this office, he labored assiduously to make himself master of every branch of music. In 1717, he was made director of concerts, and six years afterwards director of music, and cantor to St. Thomas's School, Leipsic, an appointment which he held to his death. About ten years later, the honorary distinctions of Kapellmeister to the Duke of Weissenfels, and court composer to the King of Poland, were conferred upon him. B.'s close studies affected his eyes, and an operation designed to benefit them left him totally blind, and hastened his death. With the exception of Handel, B. had no rival as an organist; and his compositions for the organ have a high reputation. They are too elaborate, however, to be popular, though his fame as a composer is sure to advance with scientific musical culture, bringing capacity to appreciate the grandeur of some of his works.

Four sons also were musicians of some note: Wilhelm Friedmann, eldest son, 1710–84; Karl Philipp Emanuel,

second son, 1714–88; Johann Christoph Friedrich, tenth son, 1732–95; Johann Christian, 1735–82. There are good lives by Hilgenfeld (1850), Bilter (1865; 2d ed. 1881), and Spitta (2 vols. 1873–80).

BACHARACH, *bâ'kâ-râk:* small town of Rhenish Prussia, on the left bank of the Rhine; 22½m. above Coblenz; with considerable commerce by river-craft. It is said to have derived its name from Bacchus (*Bacchi aræ*), and the vine is still largely cultivated in the neighborhood —producing superior wine. B. is noteworthy as the place where Blücher crossed the Rhine, 1814, Jan 1. Pop. abt 1,900.

BACHE, *bāch*, Alexander Dallas, ll.d.: scientist and educator: 1806, July 19—1867, Feb. 17; b. Philadelphia. He graduated with highest honors from West Point 1825, was asst. prof. in that institution 1826, and was appointed prof. of nat. philosophy and chemistry in the Univ. of Pennsylvania 1828. During this period, he made important scientific investigations, and was a prominent member of the Franklin Institute and of the Amer. Philos. Soc. He was selected to organize and was the first pres. of Girard College 1836; investigated the educational methods of Europe, and 1839 made a valuable report thereon. For some time he was connected with the schools of Philadelphia, and greatly improved the system of education. Under the auspices of the Amer. Philos. Soc., he opened, and for some years managed, a magnetical and meteorological observatory. He was again prof. at the Univ. of Pennsylvania 1842–3, and from the latter year till his death was supt. of the govt. Coast Survey, in which field he labored with great zeal and efficiency. He was vice-pres. of the Sanitary Commission in the civil war, was for many years an efficient regent of the Smithsonian Institution, was the first pres. of the National Acad. of Sciences, and an honorary member of numerous scientific societies in Europe. He published a large number of scientific papers, and *Observations at the Magnetic and Meteorological Observatory at the Girard College*, 3 vols. All his property was left to the National Acad. of Sciences to promote physical research. He died at Newport, R. I.

BACHE, Benjamin Franklin, m.d.: surgeon: 1801, Feb. 7—1881, Nov. 2; b. Monticello, Va.; great-grandson of Benjamin Franklin. He graduated from Princeton 1819, studied medicine at the Univ. of Pennsylvania, became asst. surgeon in the navy 1824, and surgeon 1828. While on leave of absence 1838–41, he was prof. in Kenyon College, O.; was several years with govt. fleets in foreign waters; and 1853–71 was supt. of a laboratory at the Naval Hospital in New York for furnishing medicines to the navy, from which he retired with the rank of commodore. He died at New York.

BACHE, Richard: 1737, Sep. 12—1811, July 29; b. England. He came to this country, married the only daughter of Benjamin Franklin 1767, became an insur-

ance agent in Philadelphia 1770, was financially successful, held various offices, and was postmaster-general 1776–82. He died in Berks co., Penn.

BACHE, SARAH (FRANKLIN): 1744, Sep. 11—1808, Oct. 5; wife of Richard B. and daughter of Dr. Franklin. She was well educated, and was noted for her skill in domestic affairs, and for the energy and efficiency with which she organized and managed a movement for relief of the suffering soldiers in the revolution. She directed the work of more than 2,000 women who were making garments, collected articles needed for the sick, and was a nurse in the soldiers' hospitals.

BACHELOR, n. *băch'ĕ-lẽr* [OF. *bachelier*, a lad: mid. L. *baccalārĭŭs*, a cow-herd, a lad over sixteen years—from mid. L. *bacca* for *vacca*, a cow: arbitrarily changed by university clerks at close of middle ages to *baccalau'rĕŭs—lit.*, a cow-herd, or one who cultivated certain parts of church lands]: an unmarried man of any age; one who has taken the first degree in arts in a college or university—abbreviated B.A.; in *divinity*, the first degree is B.D.; in *law*, LL.B.; in *medicine*, M.B.; in *music*, MUS. BAC. BACH'ELORSHIP, n. condition of a bachelor; or BACH'ELORISM, n. KNIGHT-BACHELOR, a knight of the lowest order; a knight belonging to no order; a young knight. This lowest grade of knighthood is now conferred only in the United Kingdom. Originally, like all knighthood, a military distinction, knighthood of this description came to be bestowed often on civilians, and in recent times it has been conferred frequently for no weightier service than carrying a congratulatory address to court. It is generally conferred by the sovereign by a verbal declaration accompanied with the imposition of the sword, and without any patent or instrument. The person who is to receive the honor kneels down before the sovereign, who touches him on the shoulder with a naked sword, saying, in French: '*Sois chevalier au nom de Dieu*' (Be a knight in God's name), and then adds: 'Rise, Sir A.B.' In exceptional cases, persons have been made Knights Bachelor by patent. See KNIGHT.

BACHELOR, *băch'ĕ-lẽr* [Lat. *baccalaureus*, or as it is variously written in old documents, *baccalareus*, *baculārius*, and *bacillarius*]. This word, which first makes its appearance in middle-age Latin, was long regarded as of uncertain etymology. The old derivation, from *bacca laurea*, a laurel berry, certainly gives us little help; but the Spanish *bachillir*, which means at once *a babbler* and a master of arts, taken in conjunction with the Portuguese *bacharel* and *bacillo*, a shoot or twig of the vine (from the Latin *baculus* or *baculum*, a stick or shoot), were thought likely by some. Brachet, however, affirms that the word is derived from the Low Latin *baccalarius*, a farm-servant, originally a cow-herd; and this plainly comes from *bacca*, Low Latin for *vacca*, a cow. Odd though it seem, this will connect fairly with the special meanings of the word given by Ducange 1. It was used, he says, to indicate a person who cultivated certain portions of church-lands called *bac-*

calaria—which he supposes to have been a corruption of *vasseleria*—a feu belonging to an inferior vassal, or to one who had not attained to a full feudal recognition. 2. It indicated ecclesiastics of a lower dignity than the other members of a religious brotherhood—i.e., monks who were still in the first stages of monkhood. 3. It was used by later writers to indicate persons in the first or probationary stage of knighthood; i.e., not esquires simply, but knights who, from poverty and the insufficient number of their retainers—from their possessing, perhaps, only the *baccalaria* above referred to—or from nonage, had not yet raised their banner in the field (*levé banniere*). 4. It was adopted to indicate the first grade or step in the career of university life. As an academical title, it was introduced by Pope Gregory IX.,13th c., into the Univ. of Paris, to denote a candidate who had undergone his first academical trials, and was authorized to give lectures, but was not yet admitted to the rank of an independent master or doctor. At a later period, it was introduced into the other faculties as the lowest academical honor, and adopted by the other universities of Europe. See DEGREE (in Univ.): UNIVERSITY. 5. It came to be used in its popular meaning of an unmarried man, who was thus regarded as a candidate or probationer for matrimony.

The legislation of almost every country, at some period of its history, has imposed penalties on male celibates or bachelors, on the principle that every citizen isbound to rear up legitimate children to the state. By the Jews, the command, 'Be fruitful and multiply,' was interpreted strictly, and every Hebrew regarded marriage as a duty. In Sparta, where the interests of the individual were sunk in those of the state, criminal proceedings were authorized by the laws of Lycurgus not only against those who neglected to marry, but against those who, from marrying late in life, or any other cause, formed such alliances as rendered the procreation of healthy children unlikely. By the laws of Solon, celibacy was treated as a crime, though the practice of interfering with the feelings of the individual in this respect early fell into disuse at Athens. At Rome, penalties and disabilities were imposed on unmarried men from an early period, and latterly on unmarried women also. In the allotment of the Campanian lands, Julius Cæsar gave portions only to those who had three or more children. The most important provisions on this subject are in the law (or rather the laws, for it consisted of an act and an amended act) called Lex Julia et Papia Poppæa, the first portion of which belongs probably to B.C. 18, and the second portion to A.D. 9. In addition to various other provisions regarding marriage, this law imposed penalties on those who lived in a state of celibacy after a certain age. No unmarried person could take a legacy, whether of a portion or of the whole possessions of a deceased person, unless he complied with the law—i.e., married within a hundred days from the testator's death. Widows were at first allowed a year from their husband's death, and divorced women six months from the time of

the divorce, before they came within the penalties of the law; and these periods were afterwards extended to two years, and a year and six months, respectively. The original provisions of the law did not apply to men beyond sixty, or woman above fifty, but they were extended to them by subsequent enactments. Childless married persons, moreover, from the ages of twenty-five to sixty in males, and twenty to fifty in females, were subject to the penalties of the *lex*, to the extent of losing one-half of any inheritance or legacy which might be bequeathed to them.

In Britain, there are numerous instances of additional or higher taxes being imposed on bachelors and widowers, but apparently more with a view to the revenue than with any other object. Of this, an instance is an act passed 1695, granting to the king certain duties on marriages, births, and burials, and on bachelors and widowers for five years, 'for carrying on the war against France with vigor.' See CELIBACY: MARRIAGE: VITAL STATISTICS.

BACHIAN, *bâ-chē-ân'*: island in the E. Indies, one of the group of Moluccas, s. of the equator. There are two elevated portions, connected by an isthmus, but little above the ocean level. The area, estimated about 900 sq. m., is largely covered with fine trees. The inhabitants reside on the coast and represent various races. The local ruler is under the authority of the Dutch. Coal and other minerals are found, and there are several hot springs. Among products of the island are cocoanuts, sago, and cloves. Many nutmeg-trees still resist the efforts of the Dutch for their extermination. The principal town is Amassing, sometimes called B., and is on the isthmus.

BACILLARIA, n. *băs-ĭl-lā'rĭ-a* [L. *bacillus*]: genus of diatomaceous Algæ: see DIATOMACEÆ. They consist of rectangular, rod-like segments, arranged either diagonally or in tabular form. The segments are continually in motion, slipping over one another, forward and backward, after the manner of a carpenter's plane.

BACILLUS, n. *bă-sĭl'lŭs*, BACIL'LI, n. plu. *-lī* [L. *bacillus*, dim. of *baculus*, rod]: one of the genera of bacteria (q.v.). The bacilli are rod-shaped and may or may not possess flagella. Many of them are motile, and a large number form spores. They are among the most numerous of the bacteria and vary greatly in size and shape. Some, like the *B. prodigiosus*, which forms a brilliant red pigment, are very short and can be mistaken for cocci, while others, like the *B. anthracis*, are much longer and larger, and when growing in chains are almost visible to the naked eye.

Some of the most important disease-producing bacteria belong to this genus. *Bacillus typhosus* is the cause of typhoid fever. *B. colcommunis*, which is always found in the healthy intestinal tract, can at times assume viru-

lent properties, causing local or even systemic disease. *B. leprœ* is the cause of leprosy. *B. diphtheriœ* produces diphtheria (q.v.). Asthis organism grows very readily in milk, diphtheria may be conveyed through this means. *B. tetani* is the cause of tetanus, or lockjaw. *B. tuberculosis*, first definitely isolated and studied by Dr. Robert Koch, is the specific cause of tuberculosis (q.v.) or consumption.

BACIOCCHI, *bât-cho'kē*, MARIE-ANNE-ELISA BONAPARTE, eldest sister of Napoleon Bonaparte: 1777–1820; b. Ajaccio, Corsica. When that island was occupied by the English, she, with her family, emigrated to Marseille, where she married, at the age of 20, a countryman of her own, Captain Baciocchi. The elevation of Napoleon raised her also to rank and power; and 1806, the principality of Massa and Carrara was intrusted to her administration, which was, on the whole, beneficial for the people. In 1809, she was made Grand Duchess of Tuscany, and appointed as administrator over that country in Napoleon's name. Here the arbitrary measures of her brother, which she had to carry out, and her own self-will and harshness, rendered her unpopular. Her husband took no part in the government. When the allies entered Tuscany, 1814, she had to leave Florence. She died, at Bologna, of nervous fever.

BACK, n. *băk* [Icel. *bak;* Pol. *opak*, the wrong way; Fr. *bac*, trough]: the part of the body that is anterior, or to the rear of the face, the upper part in quadrupeds, in man especially the rear from the shoulders to the hips; that side of a thing which is regarded as opposite to the front or face, whether below or behind, as the back of the hand, back of a door, back of a leaf; the most distant side, the portion farthest away from where one is. In special uses: that part of a seat or chair against which one may rest the back; that part of a body of ore that is uncovered but unworked or unstoped, often equivalent to 'face;' that part of a book where the leaves are joined; something placed at the back, as a water-back (hot-water boiler at the back of a kitchen range): ADJ. that is situated in the rear; behind: V. to cause a movement to the rear; to reverse the action of; to supply with a back or rear part; to mount; to aid with influence: AD. to the rear; to the place from whence one came; to a former state or condition; behind; not advancing again; into past time. BACKING, imp. BACKING, n. the act of moving backwards; the act of supporting; a thing that serves as a back, or material for making a back, as the boards, etc., at the back of a picture, a heavy timber serving as the support of an armor-plate, the mercury on the back of a mirror, or varnish on the back of a photograph; the act of furnishing with a back; in bookbinding the curving of a book's back so that it will be no thicker than the front edge, also the making flexible of a book's back. BACKING-BOARDS, pl. clamping boards for holding the inside of a book while the back is rounded. BACKING-HAMMER, n. a book-binder's curved hammer for rounding the back of a book. BACKING-

METAL, n. a soft alloy, sometimes called electrotpye metal, for filling the back of electrotype shells so as to make solid plates for printing. BACKING-PAN, n. an electrotyper's pan in which a shell is backed by pouring on molten metal. BACKED, *bakt*, pp.: ADJ. having a back. BACKER, n. one who supports another, as in a contest. BACK-ACTION, n. a reversing action, as the kick of a firearm. BACK-BAR, n. a bar at the rear, especially a bar in a fire-place for supporting a kettle. BACK-BOARD, n. a board for the support of the back; a board across the stern of a rowboat, as a back to the stern-seat; a board on the rim of a water-wheel, to prevent the water running from the floats to the interior of the wheel; a thin board as a backing for a picture, mirror, etc. BACK-CASING, n. a lining of brick or stone set in a mine-shaft to protect the workers when going through sand, gravel, etc. BACK-CENTER, n. that center of a lathe that is not driven; the dead-no center. See LATHE. BACK-CHAIN, n. a chain for holding a vessel's rudder when backing. BACK-CLOTH, n. a stout cloth used to support a fabric, as in calico-printing; also a triangular canvas in a topsail-yard, at the center, to aid in stowing. BACK-FIRE, v. to fire the grass on a prairie to make a burnt-over space for refuge when a prairie-fire is impending; to start a second fire to escape the first. BACK'FLAP, n. The inside leaf of a folding window-shutter, called also back-shutter. BACK-FRAME, n. a rotating construction for operating the whirling mechanism of a rope-making machine. BACK-FRIEND, n. one who does injury under the guise of friendship. BACK-GEAR, n. in a lathe, the gearing of the headstock for altering the driving speed. BACK-LASH, n. See GEARS AND GEARING. BACK-MAN, n. a follower in war; a henchman. BACK-MILL, n. a fulling-mill. BACK PRESSURE, reverse or opposing pressure, as on the exhaust side of a steam-engine cylinder, where it opposes the incoming live steam. BACK RENT, rent in arrears; in Scot., rent payable by a tenant after reaping the crop. BACK-ROPE, n. one of a pair of stays running from the dolphin-striker to the side of the bow; also a small rope for aiding the attachment of the cat-block hook to the anchor. BACKS, n. pl. those portions of hides that are thickest and best. BACKS AND CUTTERS, jointed structures in rocks, the *backs* running approximately parallel to the strike (q. v.) of the strata, the *cutters* crossing at approximately right angles. BACK-SAW, n. a saw with a stiffening piece at the back of the blade. BACKSET, a. *băk'sĕt*, set upon behind: N. [Scotch *set*, a lease]: whatever drives one back in any pursuit; anything which checks vegetation; in *old law*, a sub-lease in which the possession is restored on certain conditions to those who were formerly interested in it, or to some others. BACK-SIGHT, n. that sight of a gun which is nearest the breech; also a surveyor's observation when made toward a station that has been passed. BACK'STAFF, n. an instrument used, before the invention of the sextant, for calculating altitudes of stars. BACK'STITCH, n. a stitch in which the

sewer inserts the needle half way back in the previous stitch. BACK-STOP, n. in baseball, a fence or obstruction back of the catcher, for stopping passed balls; in cricket, a long-stop. BACK-STRAPPED, a. with insufficient wind to stem the current, as a vessel trying to make passage through a strait. BACK-SWORD, n. a one-edged sword: a form of English fencing-stick. BACK'WASH, n. the wash of a wave in receding. BACK'WATER, n. water held back from its natural flow, as by a dam, or in the rear of an eddy, or when thrown back by a paddle-wheel; water with little or no current shut off from a lake, sea, etc. TO BACK A ROPE, to relieve it of strain. TO BACK AN ANCHOR, to let go a small anchor to assist the grip of a larger anchor on the bottom. TO BACK AND FILL, to alternately shift the sails of a ship or brig so that they fill with wind or go slack, to carry the vessel zigzag in a channel against the wind when there is not room for tacking. TO BACK A DOCUMENT, to write a signature on its back; to endorse it. TO BACK ASTERN, to cause a boat to move stern foremost. TO BACK DOWN, to recede from one's position; to give in. TO BACK OARS, to reverse the motion in rowing. TO BACK OUT, to withdraw from an engagement or undertaking. TO BACK SAILS, to shift them so as to retard a vessel's progress or to move backward; it is done in narrow channels when the current is with the vessel, and is a useful manœuvre to avoid collisions. TO BACK UP, to give friendly and active support to; to reverse, or set going in an opposite direction; in electrotyping, to supply with a metal backing. (See backing-metal, above.) TO BACK WATER, to check a boat by reversing the oars, or a vessel by reversing the paddles or propeller.

BACK, n. *băk*, or BAC, n. *băk* [Bret. *bac*, a boat: Dut. *back*, a trough: Dan. *bakke*, a tray]: a brewer's vat or large open tub for containing beer, also called beck; a broad, flat-bottomed, tray-like ferry-boat. BACKET, n. *băk'ĕt* [from back, in the sense of a wide open vessel: F. *baquet*, a tub or pail]: in a *kitchen*, a wooden or iron trough-like vessel for carrying coal, ashes, etc.

BACK, n. [Ger. *backen*, to bake]: an instrument for toasting bread above the fire. It is like a griddle but much thicker. BACK-STONE, n. the heated stone or iron on which oat-cake is baked.

BACK, SIR GEORGE: well-known traveller in the polar regions: 1796–1878, June; b. Stockport, Eng. He accompanied Franklin and Richardson in their expedition to the n. coast of America. He volunteered to the government to go in search of Captain Ross, supposed to have been lost in his attempt to discover the Northwest Passage; and left London, 1833, Feb. 17; and, June 28, started faom Norwayhouse, a station of the Hudson Bay company. After a terrible winter with his companions at Slave Lake, he discovered, 1834, Artillery Lake, and the Great Fish river, or Back's river, which he followed to the Frozen Ocean. Being hindered by the ice from proceeding along the coast as far as Cape Turn-again, he returned by the

river; but although he had received news of the return of Captain Ross he continued his explorations in the North Sea, and did not return to England until 1835, when he was raised to the rank of post-captain for his services. In 1836,7 he further explored the arctic shores in the interest of geography. Two years afterwards, he was knighted, and had a lucrative treasury appointment; attained flag rank, 1857; admiral, 1867.

BACKACHE: pain in the back may be due to a variety of causes, some trivial, others of a serious nature. It may be located in the muscles (see LUMBAGO) or it may be neuralgic in character. In cases of disease of the spinal column, it should be noted, the pain is more commonly felt in the anterior part of the abdomen than at the seat of disease in the back. It is a common belief that pain in the back is a sign of kidney disease; during the passage of a calculus or gravel from the kidney to the bladder there may be exquisite pain in the back, and a dull ache may sometimes be felt in some forms of disease of the kidney, but when we consider all the possible causes of backache we may say that the chances of the pain being an indication of kidney trouble, in any particular instance, is slight. Disorders of the womb are frequently accompanied by pain in the back, and so may be disease of the digestive organs. The treatment of backache must depend upon the cause, since it is usually only a symptom of some other trouble, the removal of which will be followed by disappearance of the pain.

BACKBITE, v. *băk'bīt* [see BACK 1]: to slander; to speak ill of a person behind his back. BACK'BITING, imp.: N. the act of slandering the absent. BACKBITTEN, pp. *băk'bĭt'tĕn*. BACK'BITER, n. *-bī-tėr*, one who.

BACKBONE, n. *băk'bōn* [see BACK 1]: the series of bones, called vertebræ, which enclose the spinal cord of the higher animals, and constitute the spinal column; the vertebral column; the watershed of a district. TO HAVE BACKBONE, to have firmness and stability of purpose, or moral principle.

BACKDOOR, n. *băk'dōr* [see BACK 1]: a back or private passage; an indirect way.

BACKERGUNGE, *bâk-ėr-gŭnj:* town of Bengal; on B. creek, an offset from the Ganges; lat. 22° 33′ n., long. 90° 22′ e.; 125 m. e. of Calcutta. Till supplanted by Burrisol, 12 m. to the n., it was the cap. of the district; it is now in ruins.

BACKERGUNGE: district of Bengal; n. lat. from 22° 2′ to 23° 13′; in e. long. from 89° 49′ to 91°; 3,649 sq. m. Like the rest of the great delta of Bengal, B. is of alluvial formation and level surface, being watered at once by the lower streams of the Ganges and the Brahmaputra, and by the various branches or offsets which interlace those mighty rivers. In consequence of the great number of water-courses, which at once cool the atmosphere and

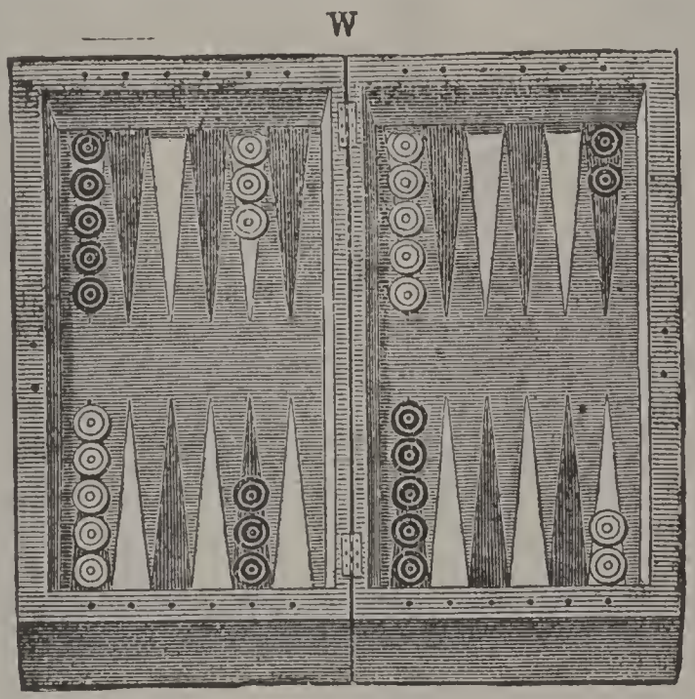
drain the soil, the country is fertile, and the temperature is said never to rise above 88° in the shade. From the same cause, the district is independent of regular roads for intercourse and communication. In the season of high water, as may be expected, inundations are common. To guard against them, the houses are built on mounds; while the corresponding excavations, like the natural 'water-holes' of Australia, serve as tanks against the effects of the dry season. As in other alluvial regions, land-slips are frequent, also the opening of new channels by the streams. The productions are rice, sugar, cotton, pulse, mustard, cocoa-nut, betel-nut, mango, guava, plantains, limes, pineapples, ginger, etc. Pop. 2,377,433.

BACKGAMMON, n. *băk-găm'mŭn* [Dan. *bakke,* a tray; *gammen,* a game]: a game played with 30 pieces on a table having 24 points, and with use of a box and dice. B. is the modern name of a game of considerable antiquity in England, where it was formerly known by the appellation of 'the tables.' Besides the derivation from the Danish, the words *back-gammon* have been ascribed to the Welsh tongue, in which they are said to signify *little battle;* but Strutt, with greater plausibility, traces the term to the Saxon *'bac* and *gamen*—that is, back-game—so denominated because the performance consists in the two players bringing their men back from their antagonist's tables into their own; or because the pieces are sometimes taken up and obliged to go back.

The constant use of dice in determining moves, makes B. essentially a game of chance. The B. board consists of two parts or tables, usually joined by a hinge in the middle, by which they can be shut up as a box. Each table has twelve points, six at each end. These points are colored white and black alternately, merely that the points may be more easily counted. The game is played by two parties, and with 30 pieces or men; each party has 15 men, one set of 15 being black, and the other white. In beginning, the men are placed on certain points, on the tables, as shown in the following figure. The game is played with two dice and two dice-boxes. The dice are common to both; but each party uses his own dice-box, and the throws are alternate. Each die is a perfect cube, marked on its sides with dots from 1 to 6. The 1 is called *ace:* the 2, *deuce;* the 3, *tre* or *trois;* the 4, *quatre;* the 5, *cinque;* and the 6, *size.* At every throw, the two dice are employed; consequently, a person may throw from 2 up to 12—that is, two *aces* up to two *sizes.* If a player throws *doublets,* or both dice of one number, double the number of dots is reckoned; thus, by a throw of two aces, the player does not count 2, but 4. These numbers thrown or accidentally turned up by the dice, bear a reference to the points on the tables. In order to understand this connection between the dice and the men, the learner must observe how the men are placed on the points, and the rules by which their shifting from one to another is governed.

The tables are here spread out as if two players were

seated, and about to begin. The player of the white men is seated at W, and the player of the black men at B. White counts round from the ace-point of Black, and Black counts round from the ace-point of White. These ace-points are respectively seen to have two men upon them in opposite corners of the same table. The grand object of the game is for each party to get all his men played round into the table containing the aces, removing them from point to point agreeable to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively, with the number on the other die. Thus, if quatre be thrown by one die, and size by the other, a man can be advanced 4 points, and another 6 points; or one man can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by two men belonging to the adversary. If covered by only one man, which is called a *blot*, then that man can be hit, and be removed from the point, and placed on the bar between the tables, his place being taken by the



The Backgammon Board.

man who has won it. The removal of a man to the bars throws a player considerably behind in the game, because the man must remain out of the play till the dice turn up a number corresponding to one open point on the adversary's table. Being fortunate to get an open point by this means, the man must be entered and wrought round from thence, as in the case of others in the set to which he belongs. The frequent occurrence of this hitting of a blot gives an adversary a great advantage, and allows him to win the gammon. There are two kinds of victory—winning the hit, and winning the gammon. The party who has played all his men round into his own table, and by

fortunate throws of the dice has borne or played the men off the points first, wins the *hit*. The gammon may be explained as follows: When you have brought all your men round to your own table, covering every point, and your adversary has a man out, then you are enabled to *bear* or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his man placed by a throw on your table, you win the gammon. If the adversary has been able to bear one before you have borne all your men, it reduces the victory to a hit. Two hits are reckoned equal to one gammon in playing matches. To win two games out of three is called winning the *rub*, as at whist.

BACKGROUND, n. *băk'ground* [see BACK 1]: ground in the rear or behind; parts dimly seen; in a picture, the part behind and subordinate to the principal figures. BACK-ROOM, n. *băk'rôm*, a room in the back part of the house. BACKSIDE, n. *băk'sīd*, the hinder part; the rear; the wrong side. BACKPIECE, n. *băk'pēs*, piece of armor which covers the back. BACKSETTLER, n. *băk-sĕt'lẽr*, one settled in the outlying districts of a new country. BACK'HANDED, a. [*back*, and *hand*]: with the hand turned backward; indirect. BACK'ING-UP, in *cricket and other games*, the act of playing up keenly; in *metals*, filling up back with metal or other materials.

BACKHUYSEN, *bâk-hoy'zn*, LUDOLPH: one of the most famous painters of the Dutch school, a master in marine painting: 1613-1709; b. Emden. His parents intended him for a commercial career; but he soon turned to painting. He was a close student of nature; often, on the approach of a storm putting to sea in a boat, in order to watch and sketch its effects, which he transferred to canvas immediately on his return home. His most famous picture is the sea piece in the gallery at Paris, which he was commissioned to paint by the magistrates of Amsterdam, and which was, 1665, sent as a present to Louis XIV. In all his pictures, the utmost truthfulness prevails, while they embody all the poetry of the sea. His coloring also is excellent. After he was 71 years old, he began etching on copper.

BACKOFEN, *bâk'ō-fen*, J. G. HEINRICH: 1768—1840: German musician and musical composer. He was remarkable for his ability upon the harp, the clarinet, the flute, etc. Birckmann had taught him the art of playing these instruments, and from Grubert he had learned to compose. He has left a great number of compositions, and two treatises on the art and method of playing various instruments.

BACKSHISH, or BACKSHEESH, n. *băk'shēsh* [Pers. *bakh-shish*, to give]: in the *East*, a present or gratuity, generally of money; properly spelled BAKSHISH (q.v.).

BACKSLIDE, v. *băk-slīd'* [see BACK 1]: to slide back; to fall out of the right path; to fall into error; to fall off; to turn away from gradually. BACKSLID'ING, imp. BACK-SLIDER, n. *băk-slī'dẽr*, one who falls from religion and the practice of virtue.

BACON.

BACKWOODS, n. plu. *băk'woodz* [*back* 1, and *woods*]: the unsettled parts of a new country. BACKWOODSMAN, n. *băk'woodz-măn*, one who inhabits the far-off woods in America.

BACK-WORM, n. *băk'wėrm:* a small worm sometimes found in a hawk's body near the kidneys, when the bird is diseased.

BACON, n. *bā'kn* [old Dut. *backe*, a pig: OF. *bacon*, a sty-fed hog: AS. *bucon* or *buccn*, beech-mast on which swine fed; the Teutonic root seems allied to the Lat. *vacca* (in mid. Lat. *baca*), a cow, and to have signified an animal in general; *bache*, in Ger., signifies among hunters a wild sow; *bake*, in Dutch, a swine in general]: the salted and dried sides of a pig or swine: bacon hams are the hind-legs cured. See HAMS: PORK.

BA'CON, *bā'kon*, ALICE MITCHELL, American educator: b. New Haven, Conn., 1858, Feb. 26; was educated privately and took the Harvard examinations in 1881; taught at the Hampton Normal and Agricultural Institute in 1883–8, and in Tokio, Japan, in 1888–9, returned to the Hampton Institute in 1889, and founded the Dixie Hospital for training colored nurses in 1890. In 1900 she again began teaching in Tokio. She published *Japanese Girls and Women*, *Japanese Interior*, etc.

BACON, AUGUSTUS OCTAVIUS, American legislator: b. Bryan County, Ga., 1839, Oct. 20. He was graduated from the University of Georgia in 1859, from the law department of the university in 1860; entered the army of the Confederate States at the beginning of the Civil War, and was adjutant of the 9th Georgia regiment in the Army of Northern Virginia, and later promoted captain and assigned to general staff duty; and in 1866 began the practice of law at Macon, Ga. In 1880 he was president of the State Democratic convention, and in 1884 a delegate from the State at large to the national Democratic convention. He was a member of the Georgia house of representatives in 1871–82, 1892, and 1893, and for the greater part of the time its speaker. Elected to the United States Senate in 1894, November he was re-elected in 1900.

BA'CON, DELIA SALTER: 1811, Feb. 2—1859, Sep. 2; b. Tallmadge, O.; daughter of David B. and sister of Leonard B. She was a successful teacher, and while in Boston, where she lived several years, delivered lectures. She published *Tales of the Puritans*; *The Bride of Fort Edward*; and *Philosophy of the Plays of Shakespeare Unfolded* (1857). In the latter work, to which Hawthorne furnished a preface, she endeavored to prove that the Shakespearean plays were written principally by Lord Bacon. She died at Hartford.

BA'CON, FRANCIS, LORD VERULAM, VISCOUNT ST. ALBANS: 1561, Jan. 22–1626; b. London; son of Sir Nicholas Bacon. His mother was the learned Anne Cooke. In early childhood he manifested superior powers and an ardent love of knowledge: his intelligence was so pre-

cocious and his sedateness so remarkable, that the queen took pleasure in calling him her 'young Lord Keeper.' At the age of thirteen he was sent to the University of Cambridge, which he quitted after a residence of three years, with a low opinion of the course of study pursued there, and, as well, of the Aristotelian philosophy. On leaving the University, he went to Paris, in the suite of Sir Amias Paulet, the English ambassador, and there busied himself chiefly with statistics and diplomacy. The sudden death of his father, 1579, Feb., recalled young Bacon to England, where, after failing to procure from the government a provision which would enable him to devote himself to science and literature, he betook himself for several years to the study of law. His professional progress was at first very slow, and it was long before he could obtain promotion in the public service. This was owing chiefly to the hostility of his uncle, the queen's first minister, Lord Burleigh, who regarded him as a dangerous rival to his own son. To Lord Burleigh and his son, Bacon, in the hope of advancement, had paid court till it was clear that no favor was to be expected from them, when he betook himself to their rival, the Earl of Essex, whose friendship he speedily won. But the earl's influence could not counteract the continued opposition of the Cecils, through whom he was defeated, 1594, in an attempt to obtain for Bacon the then vacant office of attorney-general. What the earl could do for his friend, however, he did, for shortly after this disappointment he presented him with an estate at Twickenham worth 2,000 pounds a year. The friendly relations of the earl and Bacon were broken later when Bacon appeared against Essex in the famous trial of the latter for conspiracy. Subsequent to the earl's execution Bacon endeavored to exonerate himself from the charge of ingratitude by pointing out that Essex' treason forced on him a choice between fidelity to a benefactor and loyalty to his queen and country. His apology was published at the request of the queen and was entitled 'A declaration of the practises and treasons attempted and committed by Robert, Earl of Essex.'

In 1590 Bacon obtained the post of Counsel Extraordinary to the queen, and, a few years afterwards, he entered parliament as member for Middlesex. It was not, however, till the reign of James I. that he made rapid progress. He was knighted 1603, and in the following year was appointed salaried counsel to the crown; by 1613, he had advanced to the office of attorney-general. In 1617, he was appointed Keeper of the Great Seal, and in 1619 attained the dignity of the Lord Chancellorship, with the title of Lord Verulam. In the following year he was created Viscount St. Albans.

Having attained the highest honors in the state Bacon was unscrupulous enough to use his position as a means to an unjust increase in his revenues. This furnished his many enemies with a pretext for a fatal attack upon

his reputation. In 1621 he was convicted of corruption. Disgraced, he retired from public life and devoted himself to the pursuit of science and literature. He died in 1626.

While the official life of Bacon is clouded by defects which mark him morally as a man of his age and of the court, his intellectual activity is witness to an ability and insight which place him much in advance of his contemporaries. His literary and scientific works are irradiated by the powerful light of an intellect which towered above that of other men. The first edition of his *Essays* appeared in 1597; his two books of the *Advancement of Learning*, in 1605; his *Wisdom of the Ancients* (in Latin), in 1610; a third edition of his *Essays*, greatly extended, 1612; his two books of the *Novum Organum*, or second part of the *Instauratio Magna*, designed to consist of six parts (also in Latin), in 1620; his *History of the Reign of Henry VII.*, in 1622; his nine books, *De Augmentiis Scientiarum*—a Latin translation and extension of his *Advancement of Learning*—in 1623. He wrote also several minor works. Lord Bacon's writings embrace almost all subjects, from jurisprudence—which he treated not as a mere lawyer but as a legislator and as a philosopher—to morality and medicine. The *Sermones Fideles* is a treasury of the deepest knowledge of human relations, conveyed in an energetic style. Almost the only science with which he was unacquainted was mathematics. Thus singularly gifted and accomplished, he appeared at a time when science, from a variety of causes, started on that progress which has never been arrested. To this progress Bacon contributed not a little especially by his contributions to the formulation of a correct scientific method and although we cannot now accord to this English chancellor the preeminence as the founder of modern science that was once claimed for him, it must on the other hand not be forgotten that much was accomplished through his influence.

Bacon's great motive in the formulation of his philosophy was to develop a method which would extend man's sovereignty over Nature. True knowledge is power. How, then, may this be attained? First, so Bacon maintains, man must set aside all preconceptions concerning the world. These preconceptions (or idols as Bacon designates them) are of four types: (1) Idols of the Tribe, or fallacies incident to humanity or the race in general, *e.g.*, the proneness of the mind to suppose in Nature a greater order and regularity than there really is; the reliance upon affirmative instances to the neglect of negative; the tendency to hasty generalization; the obscuring of intelligence by passion or by too great desire for immediate results. (2) Idols of the Cave, or errors due to the peculiar bodily or mental constitution of each individual. (3) Idols of the Market-place, or errors caused by words themselves as expressing ideas formed imperfectly or used loosely. (4) Idols of the Theatre, or the

tendency to put more reliance on authority and tradition than upon independent investigation. Second, man must devote his time and energies to understanding the world as it is. Man's knowledge must reflect Nature, for only by so doing can he hope to control it. If, then, knowledge is to be attained and power over Nature exercised, the following method must be followed: (*a*) Man must observe facts thoroughly. To accomplish this as many instances as possible should be noted. Each instance will thus correct observation of every other and the fact in its full character will finally be discovered. Negative instances must be investigated as carefully as positive. (*b*) Man must generalize slowly and cautiously from his observations to common natures and operative causes, referring constantly to facts. (*c*) Finally, he must test his generalization as a whole by bringing it in touch with the facts as fully observed. Only thus can man assure himself of fidelity in his interpretation of things and only thus can he hope to build upon a solid basis the structure of a practical philosophy.

Bibliography.—The collected works and life of Bacon were published by Mallet in five vols. (Lond. 1765); a good edition is that of Montague (16 vols. Lond. 1825–34); but the best, it is generally admitted, is the last (Works, seven vols., edited by Speding, Ellis, and Heath, 1858–59; Letters and Life, seven vols., by Spedding, 1862–74).

BACON, John: 1740–99, Aug. 7; b. London: a distinguished statuary. He was at first a painter on porcelain, and began to work in marble at the age of 23; yet in 1769 he received the first prize from the Royal Acad., of which he was soon after made a member. His statue of Mars established his fame. Among his principal works are two busts of George III., one in Christ Church College, Oxford; the other in the univ. library at Göttingen; the monuments of Lord Chatham in Westminster Abbey and in Guildhall; the statues of Howard and of Samuel Johnson in St. Paul's, and that of Blackstone at Oxford. B. was deficient in imagination, and had no refined perception of beauty.

BA'CON, John Mosby, American military officer: b. Kentucky, 1844, April 17; served in the Union army through the Civil War; was appointed captain in the 9th United States Cavalry, in 1866, and colonel of the 8th cavalry in 1897. On 1898, May 4, he was appointed brigadier-general of volunteers and placed in command of the Department of Dakota. In October of that year he put down the outbreak of the Pillager band of the Chippewa Indians in Cass County, Minn. Subsequently, he was assigned to duty in Cuba, with headquarters at Neuvitas, till 1899, May 8, when he was retired.

BA'CON, Leonard, d.d., 1802, Feb. 19—1881, Dec. 24; b. Detroit, Mich. (where his father was a missionary); d. New Haven, Conn.: an American clergyman. He studied at Yale College and Andover Theological Seminary, and in

1825 was called to the pastorate of the First Congregational Church at New Haven, retaining the position until 1876, when he was chosen professor of theology, and subsequently lecturer on ecclesiastical history, in Yale College. His connection with religious periodical literature began as early as 1826, when he became one of the editors of *The Christian Spectator*, continuing to act as such until 1838. In 1843, he aided in establishing *The New Englander*, to which he was a frequent contributor until near the close of his life. In 1847, he was one of the founders of a weekly newspaper, the New York *Independent*, of which he was one of the editors until 1863, and also wrote largely for it, after retiring from the active editorial management of it. Dr. Bacon bore a prominent part in the more secular affairs of his denomination, and in the discussions upon the moral and social questions of the time. He also wrote several books, among which are *Life of Richard Baxter* (1830); *Manual for Young Church Members* (1833); *Historical Discourses on the Completion of Two Hundred Years from the Beginning of the First Church in New Haven* (1839); *Slavery Discussed in Occasional Lectures from* 1833 *to* 1838 (1846); *Christian Self-Culture* (1863); an *Introductory Essay to Conybeare and Howson's St. Paul* (1868); besides a large number of published *Addresses* before various college associations. The great bulk of his written productions are, however, to be found in his numerous contributions to current religious literature.

BACON, Leonard Woolsey, dd., m.d.: clergyman: b. New Haven, Conn., 1830, Jan. 1; son of Leonard B., d.d., of First Church, New Haven. He studied at Yale, where he graduated 1850, and then studied theology at both Andover and Yale, and medicine at the latter college, being given his degree in 1855. He preached in Congl. and Presb. churches in various cities and towns; lived five years in Europe; and in 1877 became pastor of the Park Congl. Church, Norwich, Conn. In 1885 he was chosen pastor of the Woodland Presb. Church, Philadelphia, Penn. Leaving Philadelphia, he had pastoral charge of the Ancient Independent Church, Savannah, Ga., for several months, returning 1887, Dec., to Norwich, Conn. He is well known as a writer, having contributed to numerous periodicals, and also as a musical composer. His published works include: *Congregational Hymn and Tune Book* (1857); *The Life, Speeches, and Discourses of Father Hyacinthe* (1872); *The Vatican Council* (1872); *Church Papers* (1876); *A Life Worth Living: Life of Emily Bliss Gould* (1878); *Sunday Observance and Sunday Law* (1882); *The Hymns of Martin Luther* (1883); *The Church Book: Hymns and Tunes* (1883); and *The Simplicity That Is in Christ* (sermons, 1886); *Irenics and Polemics* (1898); *History of American Christianity* (1898); *Story of the Congregationalists* (1904).

BACON, Nathaniel, American insurrectionary leader: b. Friston Hall, Suffolk, England, 1647, Jan. 2; d. 1676, Oct. 26. His great-grandfather was cousin to Lord Bacon;

his mother, a Brooke, was daughter of a Suffolk knight. He entered St. Catherine's College, Cambridge, in 1660; took M.A. 1667; studied law at Gray's Inn, London, and traveled on the Continent. He found life too straitened in England on the income his father allowed him, and the latter gave him £1,800 outright to emigrate to Virginia, where his cousin, Nicholas Bacon, had been living since 1650. He arrived in the latter part of 1673 with a young wife, daughter of Sir Edward Duke, and soon became a member of the governor's council, as was his cousin; and settled on a plantation some 20 miles below Richmond, on the James, called 'Curle's Wharf.' He had also another on a part of the site of Richmond, the attack on which by the Indians was part of the raid that brought on the imbroglio known as Bacon's Rebellion (q. v.). He led the colonial forces against the Indians, and resisted the policy of Gov. Berkeley, who proclaimed him a rebel 1676, May 29. He was tried and acquitted, and died while attempting to force the gov. to fulfil his promises.

BACON, Sir Nicholas: 1510–79, Feb. 20.; b. Chiselhurst, Kent; father of Lord Bacon. With excellent education, and good natural abilities, he prospered in the legal profession, and at the age of 27 he was appointed solicitor to the Court of Augmentations; two years later, on the dissolution of the monasteries by Henry VIII., he had the courage to present to that irascible monarch a project for applying a part of the wealth 'rescued' from the church, in founding a college for the study of politics and diplomacy. Unfortunately, the king had already squandered it in presents. Henry advanced B., 1546, to the office of Attorney of the Court of Wards, which he retained during the reign of Edward VI.; but his Protestantism caused him to be deprived of all public honors and emoluments at the Rom. Cath. succession. On the death of Mary, he was made by Queen Elizabeth a member of the Protestant part of the Privy Council; and in 1558, received at her hands the Great Seal. In the beginning of 1559, he opened parliament with a judicious speech on the difficult subject of a national religion. He was also president of that assembly of ecclesiastical disputants which met in Westminster two months later, to discuss the points of controversy between Protestants and Rom. Catholics. In 1564, he suffered a temporary eclipse of royal favor; but through the efforts of his constant friend, Sir William Cecil, he was restored to favor, and Elizabeth even visited him, 1577, at his magnificent mansion of Gorhambury, Hertfordshire.

BACON, Roger: 1214–92 (or 94); b. Ilchester, county of Somerset, Eng., of a respectable family: English monk who, through the force of his intellect, raised himself far above his age, made wonderful discoveries in several sciences, and contributed much to extend the scanty knowledge of nature. He studied at Oxford; then at Paris, where he received the degree of doctor in theology; and soon after his return home, he entered the order of

the Franciscans, and settled at Oxford. Physics seem to have been at that time the chief object of his labors; and liberal friends of science supplied him with the means of pursuing his researches. In exploring the secrets of nature, he made discoveries and invented applications which were looked upon by the ignorant as the work of hellish magic. This prejudice was encouraged by the jealousy and hate with which his brother monks regarded his superiority. Besides, he loudly denounced the ignorance and immorality of the clergy, especially of the monks, and even wrote a letter to the pope, in which he represented to him the necessity of clerical reform. Out of revenge an accusation was brought against him at the papal court and the pope interdicted him from teaching in the university. He was shortly afterwards imprisoned, forbidden all human intercourse, and hardly allowed sufficient food. Among the few clear-sighted men who admired Bacon's genius, and pitied his misfortunes, was the cardinal-bishop of Sabina, at that time papal legate in England. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On his ascent to the papal throne as Clement IV., B. wrote to him, expressing his readiness to furnish him with whatever he desired, and Clement in reply repeated his request to see B.'s works, in defiance of the Franciscan prohibition. B. accordingly drew up his *Opus Magnus* (edited by Jebb, 1733), which he sent, with two other works, it is said, to the pope, by his favorite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through a diligent study of the languages and of nature. How Clement received them is not well known; but they could only have reached him about the time when he was seized with his last illness. For ten years after Clement's death, B. was free from open persecution at least. But in 1278, under Nicholas III., the general of the Franciscan order, Jerome of Esculo, declared himself against B., forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by the pope. The new imprisonment lasted ten years. When Jerome of Esculo became pope, under the name of Nicholas IV., B. sent him a *Treatise on the Means of warding off the Infirmities of Old Age* (Lat. Oxf. 1590; Eng. by Brown, 1683), with a view to convince him of the harmlessness and utility of his labors, but in vain. What the pope refused to the representations of the old philosopher, was yielded to the intercession of several influential English noblemen, and B. at last recovered his freedom. He returned to Oxford, wrote a compendium of theology, and shortly afterwards died.

Bacon was a voluminous author and many of his writings are still in manuscript in British and French libraries. Of his numerous published works the *Opus Magnus* is the most important. Whewell has spoken of it as the encyclopædia and organon of the 13th c. In its introductory division, Bacon deals with the causes which

retard the development of knowledge and which, by consequence, are sources of error. These are custom, authority, unintelligent opinion, and mere pretence of knowledge. Bacon was essentially modern in his feeling that the holding of an opinion just because it happens to be believed by others and in disregard of what facts may offer to teach is one of the greatest of barriers to the acquisition of sound knowledge and to the development of civilization. For him also the recognition of authority other than that of facts was one of the surest of ways by which to make impossible any contact between the mind and the world as it really is. Hence Bacon preferred to go to nature for his physical knowledge and to the classical originals insofar as he could obtain them for his knowledge of the teachings of the ancients. He was distrustful of mere book learning and of second hand information of every kind. His attitude in this regard made him, accordingly, a person to be suspected by the majority of the ecclesiastics of his own day but, on the other hand, it has given him the distinction of being one of the very earliest pioneers of the scientific spirit and method which are now regarded as being fundamental to the development of free life and of a progressive civilization. It was this same modernity of spirit which prompted Bacon's outspoken and often indiscreet contempt of ignorance and stupidity in high educational circles and of the assertiveness of hastily formed and imperfectly tested opinions.

Immediately following the introductory section upon method in the *Opus Magnus* Bacon treats of the relation of philosophy to religion. In this part, while admitting that the scriptures of the Old and New Testaments are the embodiment of true knowledge, the author contends that they must be investigated and interpreted in a liberal manner and according to scientific methods. This discussion opens up the way to a masterly treatment of the value of a thorough study of language. His contention is that language should be so studied that the exact thought and intention of the author may be reached. Bacon's intellectual conscience was as free and as scientific in this matter of language as in the study of physical nature. Next follows an exposition of the mathematical method as the essential means for obtaining an exact science. His convictions on this point Bacon backs by copious and fruitful illustrations drawn from the fields of geometry, physics, astronomy, geography, and even theology. With the versatility which was so marked a feature of his intellectual life Bacon takes up psychology. Upon this subject the *Opus Magnus* speaks at very considerable length and with surprising insight. Many of his ideas nowadays strike us as being peculiar but nonetheless there is much of genuine knowledge and of solid scholarship in his contribution. This is especially true of his views upon the physiology and psychology of vision.

Bacon reconciles his views on science and religion in a very interesting manner. In all that concerns the outer

GOV. BERKELEY AND BACON THE "REBEL."

world—the field of science—we must depend upon exact experiment. The world of the inner life—the field of religion—demands not experiment but illumination. Here we are at once reminded of Aristotle with his differing criteria of truth for the world of sense and for the world of reason.

But although an extraordinary genius Bacon could not free himself from all the errors of his time. He believed in the philosopher's stone and in astrology. Against this however must be set his inventions with reference to the magnifying glass and his acquaintance with the production of gunpowder, his discoveries of the errors in the calendar and his proposals for their rectification.

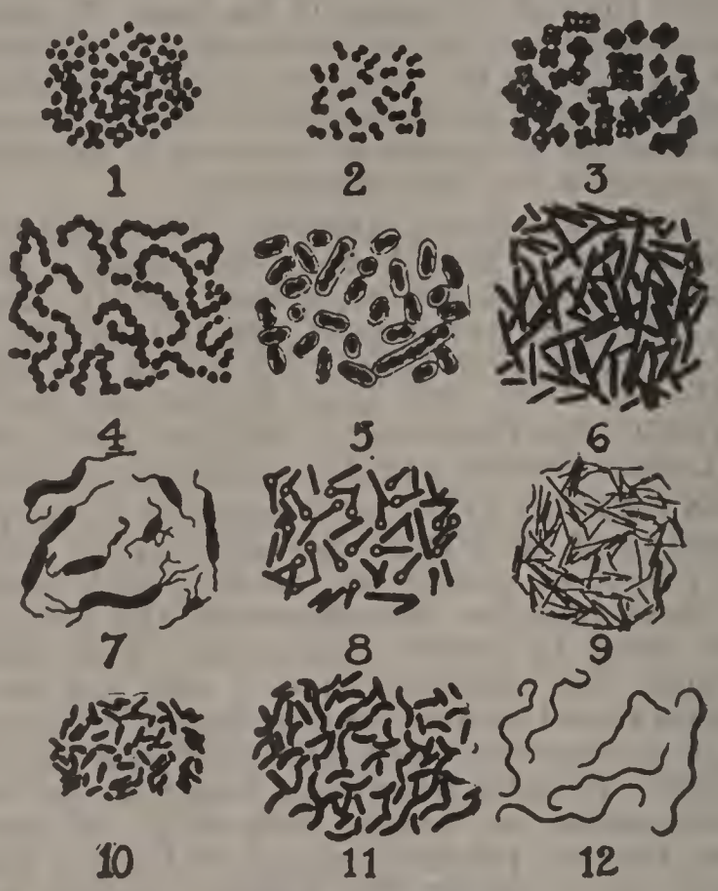
BACON, Thomas Scott, American theological writer: b. Saratoga, N. Y., 1825, Feb. 1. Originally a lawyer, he became an Episcopal clergyman (1854). Besides sermons, addresses, reviews, etc., he has written *Both Sides of the Controversy Between the Roman and the Reformed Church* (1858); *The Reign of God, not the Reign of Law* (1879): *The Beginnings of Religion* (1887); *Primitive and Catholic Doctrine as to Holy Scripture; It is written.*

BACON'S REBELLION: in 1676, a result of the oppressive measures of Sir William Berkeley (q.v.) of Virginia and his refusal to protect the colonists with adequate military force from the depredations of the Indians, or to allow them to protect themselves. The colonists finally raised 300 volunteers on their own risk, and by acclamation placed at their head Nathaniel Bacon (q.v.), one of the governor's council, who wrote to Berkeley for a commission; Berkeley refused and Bacon started on his expedition against the Indians without it. He was arrested but Berkeley paroled him, and on Bacon's making submission for attacking the Indians without license promised to give him his commission to finish the Indian war. The legislature provided for raising an army of 1,000 men, but Bacon, still refused the commission, and privately warned that his life was in danger, fled, shortly returned with 600 men, and forced Berkeley to sign his commission as major-general for the Indian campaign. Bacon within a month had nearly put down the Indian outbreak, when he heard that the governor had proclaimed him and his party rebels, and to escape popular wrath had fled across the peninsula to Accomac. Bacon marched back to Middle Plantation (the site of Williamsburg), launched a manifesto against Berkeley, and drew around him a gathering of some prominent men and a vast number of penniless ones. He carried on the Indian campaign till September, thoroughly stamping out the danger to the colony; meantime sending an expedition to capture Berkeley, which was itself captured. Berkeley gathered about 1,000 militia and reoccupied Jamestown; Bacon marched against him, drove him to Accomac once more, and burnt Jamestown to the ground. Bacon soon afterward died. The rebellion at once collapsed, and Berkeley wreaked a frightful vengeance upon Bacon's adherents.

BACON BEETLE: see DERMESTES.

BACONIAN, adj. *bā-kō′nĭ-ăn:* of or pertaining to *Lord Bacon* or his philosophy.

BACTERIA, *băk-tē′rĭ-a,* n. plu. of BACTERIUM (q.v.). BACTERIAL, or BACTERIAN, adj. of, pertaining to, or like bacteria; caused by bacteria; as, *bacterial* diseases. BAC-



Forms of Bacteria.

1. Spheroidal bacteria (*Micrococcus pyogenes*), one of the most common species of bacteria, causing suppuration. 2. Spheroidal bacteria arranged in pairs (*Diplococcus*). 3. Spheroidal bacteria grouped in cuboidal masses (*Sarcina*). 4. Spheroidal bacteria grouped in chains (*Streptococcus*). The species shown in the illustration is *S. erysipelatis*, producing erysipelas. 5. Diplococci slightly lance-shaped, and surrounded by a capsule. This species (*Diplococcus pneumoniæ*) is the most common germ, causing acute pneumonia. 6. The bacterium causing typhoid fever (*Bacillus typhosus*). 7. Bacilli with cilia. 8. Bacilli with spores. This species (*Bacillus tetani*) produces lockjaw. 9. The bacillus of consumption (*Bacillus tuberculosis*). 10. The bacterium of diphtheria (*Bacillus diphtheriæ*). 11. The spirillum (*S. choleræ asiaticæ*) of Asiatic cholera. 12. The spirillum (*S. obermeieri*) of recurrent fever. This is now generally regarded as belonging to the animal group of microorganisms and is classed among the spirochaetæ.

[From Funk & Wagnalls' *Standard Dictionary.* By special arrangement.]

BACTERIFORM, adj. having the form of a bacterium; bacterioid. BACTERIOID or BACTEROID, adj. resembling or allied to bacteria; n. a stage of certain bacteria at which they resemble forms of the genus Bacterium. BACTERIOLOGY, n. department of biology which deals with bacteria. BACTERITIC, adj. caused or characterized by bacteria. BACTERIUM, n., *băk-tē′rĭ-ŭm;* plu. BACTERIA, *-rĭ-a* [Gr. *bak-*

terion, dim. of *baktron*, stick, staff]: a schizomycete or microscopic fission-fungus; a microbe.

Bacteria is a general name given to a large class of minute one-celled vegetal organisms that possess no chlorophyll, and which reproduce by equal fission, or by means of spores formed at the ends or in the body of the organism.

Their exact position in the scale of life is still in dispute; but the weight of evidence goes to show that they are plants, and that they are fungi. From the evolutionary point of view they appear to be derived from some of the lowest algæ, the Cyanophyceæ or blue-green algæ. The relationship of the higher bacteria to the algæ is marked. On the other hand they are closely related to the yeasts.

The B. vary greatly in size and shape, the smallest which have been seen being about 1-50,000 of an inch in length and 1-125,000 of an inch in width, while some of the larger are about 1-500 of an inch long. It is believed that certain bacteria are so small that they are invisible under the most powerful microscope. A large number of them are motile and move through the liquids in which they happen to be, by means of minute hair-like processes, the flagella, which extend from their protoplasm. These flagella vary in number: in some cases there is one flagellum at one end; in other cases there are two, one at each end; in others there are bundles of flagella at either or both ends; and in some the flagella are all around the body of the bacterium, as in the bacillus of typhoid fever.

The B. are for practical consideration divided into two large groups, the higher B. and the lower B. Among the higher are Streptothrix, Cladothrix, and Leptothrix; they are usually larger than the lower B., generally rod-shaped and growing in long chains or forming branches. They shade off into the algæ of the simplest forms. Very few of them are of hygienic interest. The classification of the bacteria is difficult, but for practical purposes they are usually grouped under four families: (1) Coccaceæ, (2) Bacteriaceæ, (3) Spirillaceæ, (4) Chlamydobacteriaceæ.

The first of the above families (Coccaceæ) are characterized by their spherical form. A number of genera are described. Micrococci when growing singly; Diplococci when growing in pairs; Streptococci when growing in chains; Staphylococci when growing in bunches, and Sarcinæ when growing in packets in three dimensions. Very few of the cocci have flagella, hence they rarely are motile. Spores are rare. The different forms are widely distributed, and several cause disease in man. Thus *Streptococcus erysipelatos* is the cause of erysipelas; *Streptococcus pyogenes* and *Staphylococcus pyogenes* cause suppuration; pneumonia is caused by the *diplococcus pneumoniæ;* and certain kinds of digestive disturbances are constantly associated with forms of *Sarcinæ*. In the second family (Bacteriaceæ) are the rod-shaped bacteria—the bacilli (see BACILLUS). The third family (Spirillaceæ) contains the curved bacteria. Some of these are no longer

regarded as bacteria, or vegetable organisms, but as members of the animal kingdom. (See SPIRILLUM and SPIROCHAETE.) In the fourth family are the higher bacteria (Streptothrix, Cladothrix, etc.), which are more or less closely related to the yeasts and algæ.

Reproduction of B. is carried on in two ways, viz., by means of spores, and by simple fission where one bacterium divides in half and forms two, continuing the process as long as sufficient food-material is found. As fission may take place every 20 minutes, the progeny of one germ may be prodigious. At the rate of one division for every hour, the aggregate number at the end of 24 hours would be 16,777,220 individuals. When the food-material is diminished there develop either at the ends or in the body of some bacteria certain small highly refractile spherical or oblong bodies; these are the spores. Sometimes, for reasons not yet fully appreciated, the spores are formed also when there is an abundance of food-material. The spores are particularly resistant to destructive agencies, and in order to kill them it is necessary to practice what is known as fractional sterilization. Thus, food-material infected with micro-organisms will contain no fully developed living bacteria after being sterilized once by steam for 15 or 20 minutes, but may contain the more resistant spores which the heat does not destroy. If left for 24 hours, however, the spores have time to germinate, and a second sterilization will kill those that are then developed. For all practical purposes a third sterilization is generally sufficient to kill the most resistant spores. When B. grow rapidly they often develop a semi-gelatinous coating which unites great numbers of them in masses which are termed *zooglœa*.

B. are recognized by the bacteriologist, not entirely by their shape, as many of them look alike under the microscope, but by their biological characters as they grow in culture-tubes especially devised for the purpose. Thus a large number of them develop coloring matters, blue, green, yellow, brown, black, or red. The *Bacillus prodigiosus* and the *Bacillus rosaceus* both develop brilliant red pigments closely resembling freshly shed blood. Such B. are called *chromogenic*. A number develop beautiful fluorescent shades of green: many such forms are found in water. Others have the power of rendering gelatin fluid, others coagulate milk. Some develop acids and some develop alkalies. Most of them can live only in the presence of oxygen, while others can develop only in the absence of oxygen; such are called respectively *aërobic* and *anaërobic*. A great many B. live only on dead organic matter; such are called *saprophytic*, while others live exclusively on living matter; these are called *parasitic;* many are both parasitic and saprophytic.

The chief interest in the B., from both the hygienic and the economic point of view, is in the fact that they are capable of developing certain chemical substances, either

in their own bodies or in the food-materials in which they grow, which substances can produce poisoning in man, in the lower animals, and in plants. This poisoning may be acute, as in certain forms of ptomain poisoning, or it may be subacute or chronic when the B. grow in the bodies of animals or plants and produce such diseases as pneumonia, typhoid fever, consumption, or cucumber-wilt.

Not all of the B., however, develop harmful products. The greater proportion are innocuous, and many are of immense service to man and to all living things. The flavor of butter, the quality and taste of cheese, the bouquet of wines, are due in great measure to the growth of some forms of these organisms.

They are distributed everywhere in great numbers, in the air, in water, in ice, in milk, in butter, in all of our foods, in the soil, in plants, and in animals. A large and peculiar group grow in intimate connection with the roots of plants; their function seems to be the breaking up of the nitrogenous compounds in the soil, to provide the roots with nitrate necessary for growth of the plants. Without such groups of B. in the soil the nutritious qualities of many plant-products would be lessened. This is true especially of peas and beans and other leguminous plants. Perhaps the most world-wide value of B. is their ability to decompose all forms of organic matter and by reducing it to its simplest terms redistribute the original elements to the soil to be used again in other forms of organic life.

The historical study of B. dates back to the time of Leuwenhoek in the 17th c. Ehrenbergh in 1840 was the first to give accurate descriptions and trustworthy drawings, but the greatest advances have been made since 1880, when Pasteur discovered the bacillus of fowl cholera and a means of protective inoculation against anthrax; and 1881, when Koch introduced the methods of growing B. upon solid artificial media which have enabled investigators to study the microscopic characteristics and the life-history of each individual without danger of confusion.

BACTRIA, *băk'trĭ-a:* ancient name of the imperfectly known land between the w. part of the Hindu Kush Mountains, and the river Oxus (Amu or Gihon) which separated it from Sogdiana on the n. and n.e. It is generally considered identical with the modern Balkh (q. v.). B. is the supposed seat of the parent-people from which the Aryan (q. v.) or Indo-European family branched off. B. was originally the center of a powerful kingdom in e. Persia, but we know only that Ninus, Assyrian king, with his vast army, found difficulty in conquering it, and that when Arbaces besieged the last Assyrian king, Sardanapalus, in his metropolis, he was assisted by a large force of Bactrians. It is believed that the ancient Persian religion was developed first in Bactric or Zariaspa, the capital of B., which was the headquarters of the Magi till the land was overrun by the Arabs, and a centre point of the inland trade of Asia. The modern

town of Balkh (q.v.) is built upon its site. Alexander, on his return from Persia, left in B. a colony of 14,000 Greeks, who here extended civilization. After the death of Alexander, B. was annexed to the kingdom of Syria; but was raised to independence by its governor, Diodotus I., who founded the Greek kingdom of New B. about B.C. 256. The history of this kingdom, formerly little known, has been recently elucidated by numerous Græco-Bactrian coins found in the *topes* or burial-places of Afghanistan. These coins give the names of a series of kings, and bear indications of the political circumstances of the Greek kingdom of B. On those of Eucratides, a monarch in the age of Mithridates, are found, besides the Greek characters, others which have been proved to belong to a dialect of the Sanskrit, and have been very happily deciphered by Mr. Prinsep.

BACTRIS, n. *băk'trĭs* [Gr. *baktron*, a cane, from the smaller stems being formed into walking-sticks]: genus of Palms, of which nearly 50 species are known, all American. The leaves of some are pinnate, of others entire. They are generally small palms, some very small, with slender stems; that of *B. tenuis* is not thicker than a goose-quill. Some are spiny, and form thickets not easily traversed. *B. acanthocarpa* is called TUCUM, near Bahia, and from it an extremely tough thread is obtained, which is used for making nets. *B. Maraja*, the MARAJA' palm, produces large clusters of fruit, resembling small grapes, with a thin pulp of an agreeable subacid flavor.

BACTRITES, *bak-trī'tēz:* genus of fossil *Ammonitidæ*, with a straight shell, and indented but not ramified septa. Five species have been described, all from Devonian strata.

BACULE, n. *băk'ūl* [Fr. *bascule*, see-saw]: a kind of portcullis or gate made like a pitfall, with a counterpoise, and supported by two large stakes. It is usually erected before the *corps de gard*, not far from the gate of a place.

BACULITES, *băk'ū-līts:* genus of the family of *Ammonitidæ*, differing from the true *Ammonites* (q.v.) in the perfectly straight form of the shell, which tapers to a point, and is either round or compressed. The species, like the other Ammonitidæ, are all fossil. B. are characteristic of the upper chalk, and appear to have existed only towards the end of the period of existence of the Ammonitidæ.

Baculite.

BACULOMETRY, n. *băk'ū lŏm'ĕ-trĭ* [L. *baculum*, a staff; Gr. *metron*, a measure]: the art of measuring accesible or inaccessible distances or lines, by the help of staves or rods.

BACUP, *băk'ŭp:* rapidly increasing and prosperous town of Lancashire; a station of the East Lancashire railway; in a beautiful valley near the borders of Yorkshire; 15 m. n. from Manchester, 12 m. e. by s. from Blackburn. There are churches of all denominations, a mechanics' and a literary institute, reading-rooms, etc., and a beautiful market-house was opened 1867, Aug. B. has extensive cotton-factories, dye-works, brass

and iron foundries. There are numerous coal-mines in the neighborhood; and within a mile large woolen manufactories. Pop. (1891) 23,498; (1901) 22,505.

BAD, a. *băd* [Cornish, *bad;* Gael. *baodh,* foolish, stupid: Ger. *böse;* Dut. *boos;* Pers. *bad,* bad, perverse]: evil; hurtful; opposite of good. BAD'LY, ad. *-lĭ,* not well. BAD'NESS, n. the state of being bad or vicious; want of good qualities, natural or moral. GONE TO THE BAD, become a depraved and worthless character.—SYN. of 'bad': wicked; evil; naughty; corrupt; sinful; vicious; ill.

BADA'GRY: seaport town on the Gold Coast of Upper Guinea. Formerly it carried on a large trade in slaves with the Portuguese, who here established several factories. B. now belongs to Great Britain. It was from this place that Lander and Clapperton started on their expeditions to explore the African interior. Pop. 10,000.

BADAJOZ, *bâd-a-hōs'* (called by the Romans Pax Augusta, and by the Moors Beledaix, i.e. 'Land of Health'): cap. of the Spanish province of B.; about five m. from the border of Portugal, in a fruitful district on the left bank of the Guadiana, here crossed by a stone bridge of 28 arches. B. is a fortress of the first rank, the residence of a cap. gen., and the see of a bp., and has an old cathedral with a splendid organ, and paintings by Mateo Cerezo, and Morales, who was born at B.: a brisk traffic, chiefly contraband, is carried on with Portugal. Its chief manufactures are soap, coarse woolens, leather, and delft-ware. As one of the keys of Portugal, B. has often been a place of importance in war. It was besieged in vain by the Portuguese, 1660, and again by the allies, in the Spanish War of Succession, 1705. During the French war, B. was besieged by the French, 1808 and 9, and again 1811, when it surrendered, March 11, to Soult. It was thrice besieged by the English under Wellington: first 1811, Apr. 17, after the conquest of Olivenza, on which occasion the approach of Soult to its relief caused the siege to be raised May 14, the second time, after the battles of Fuentes d'Onor and Albuera, the city was invested 1811, May 27—June 10, but still in vain. The third investment, 1812, March 17, ended in the taking of the city by storm, on the night of Apr. 6, after a murderous contest, and a loss during the twenty days' siege, of 72 officers and 963 men killed, and 306 officers and 3,483 men wounded. Pop. of B. (1887) 22,376; (1900) 30,899.

The province of B. has 8,451 sq. m.; pop. (1900) 520,246. See ESTREMADURA.

BADAKHSHAN, *băd-ăk-shân',* or BUDUKHSHAN, *bŭd-ŭk-shân':* territory of central Asia between 36° and 37° n. lat., 69° and 73° e. long.; between the chain of the Hindu Kush and the Oxus. It is drained by the Kokcha, a tributary of the Oxus, and is famous throughout the East as a picturesque hill-country covered with woods, rich pasture, and fertile and well-cultivated valleys. B. formed part of the empire of Nadir Shah, after whose death it became subject to the Afghans. In 1823 the Uzbecks, under Murad

Beg, taking advantage of the disturbed state of Afghanistan, defeated the tribes of B. in a pitched battle; and two years later their subjection was completed. On the death of Murad, 1845, B. seems to have become for a time independent. The Afghans, however, soon reasserted their claims. In 1859 they conquered Kunduz, and were about to annex B., when the Mir, or head-chief, agreed to pay an annual tribute. In 1863 Jehandar Shah, the Mir of B., was superseded by Mir Mamud Shah, another of the royal family of B., supported by the Afghans. This gave rise to a struggle which ended in the nephews of Jehandar acquiring control. Pop. estimated 350,000.

BADDERLOCKS, *băd'dėr-lŏks,* or HEN'WARE (*Alaria esculenta*): a sea-weed (see ALGÆ, where a figure of it is given), of the sub-order *Fucaceæ,* growing on rocks in deep water on the shores of Britain, Iceland, and the n. of Europe. It has a stem 4–8 inches long, pinnated with a few short leaflets, which contain the seeds, and a membranous olive-green frond of 2–12 ft. long, with a stout mid-rib. The frond being stripped off, the mid-rib forms an article of food to the inhabitants of the sea-coasts. The thinner part of the frond also is sometimes eaten.

BADE, v. *băd:* pt. of BID, which see.

BADEAU, *bă-dō',* ADAM: born New York, 1831, Dec. 29; d. 1895, Mar. 19. He was privately educated and became a contributor to the press. In 1862 he volunteered in the army, and was attached to the staff of Brig.Gen. Thomas W. Sherman. He was wounded at Port Hudson 1863, May 27. 1864, Mar., he was appointed milit.sec. to Gen. Grant, with the rank of lieut.col., being afterward promoted col., and continued on his staff till 1869, Mar., when he retired as capt. and brevet brig.gen. U. S. A. He was appointed sec. of legation to London 1869, May, and a year later consul-gen. at the same place, remaining till 1881, Sep., obtaining leave of absence 1877–8 to accompany Gen. Grant around the world. 1882–84 he was consul-gen. at Havana: 1888 brought suit against Grant's estate, for services in compiling the general's *Personal Memoirs;* and 1890 was dropped from the retired list of the army. His publications include: *The Vagabond* (New York, 1889); *Military History of Ulysses S. Grant* (3 vols. 1867–81); *Conspiracy: A Cuban Romance* (1885); *Aristocracy in England* (1886); and *Grant in Peace* (1886).

BADEN, *bâ'dėn:* fashionable watering-place in the canton of Aargau, Switzerland; on the left bank of the Limmat. It is of ancient date, known to the Romans as *Thermæ Helveticæ.* It has a town-hall, a handsome Roman Catholic church, a convent, monastery, hospital, etc., and is celebrated for its hot sulphurous baths, which are employed in gout, rheumatism and cutaneous diseases. The hottest springs have a temperature of 116° F. The Romans were well acquainted with the baths here; and between the 15th and 18th centuries they were the most celebrated in Europe. Pop. (1900) 6,100.

BADEN, *bâ'dĕn*, GRAND DUCHY OF: at the s.w. extremity of the German empire; 5,900 sq. m. It extends in the direction of the valley of the Upper Rhine and of the Black Forest, from the s. bend of the Main at Wertheim to the Bodensee or Lake of Constance; is bounded on the n. by Bavaria and Hesse-Darmstadt; on the e. by Hohenzollern, Würtemberg, Bavaria; and on the w. and s. by the Rhine, which separates it from Rhenish Bavaria, Alsace, and Switzerland. It is divided politically into four circles —the circle of the 'Lake,' at the s., and the circles of the 'Upper Rhine,' of the 'Central Rhine,' and of the 'Lower Rhine;' these are again divided into 79 districts.

Surface and Hydrography.—Physically, B. falls into two divisions—the w. plain, along the right bank of the Rhine, and the e. highlands; the plain occupying about a fifth of the whole duchy, and the hilly part four-fifths. Of the mountain-ranges, the Schwarzwald, or Black Forest, is the most prominent. See BLACK FOREST. For a distance of 96 m., it belongs almost exclusively to Baden. It terminates in abrupt declivities towards the w., and on the e. descends by degrees into the plateau of the Neckar in Würtemberg. It decreases in height from s. to n., its mean elevation being from about 4,000 to 2,700 ft., and is cut into sections by numerous deep and wildly romantic valleys. The most remarkable summits are Feldberg and Belchen in the s. The less elevated part of the mountainous division of B., to the n. of the Murg, receives the general name of the Neckar highlands, as far as to its intersection by the Neckar valley, on the n. side of which the Odenwald begins. Southward, in the circle of the 'Lake,' rise the extensive plateaus of the German Jura. This table-land is known by the local name of the Randen. In the plain of the 'Upper Rhine' between Altbreisach and Endingen stands the small isolated basaltic group of the Kaiserstuhl, or Emperor's Seat, rising to the height of 1,100 ft., and overlooking the Rhine.

Being drained by the Rhine and the Danube, B. belongs to the basins of two opposite seas; the sources of the Danube, however, drain only about 336 sq. m. in the n. part of the 'Circle of the Lake.' Beginning with the Bodensee, which projects three arms or bays on the n.w. into B., the Rhine, in its tumultuous course, forms the s. boundary, interrupted, however, by several encroachments of the Swiss territories upon its n. bank. From Basel to below Mannheim, the stream is the only and natural boundary. The chief tributaries of the Rhine, on the B. side, are the Neckar, the Kinzig, the Murg, the Elz, the Dreisam, and the Pfinz. On the n.e. the Baden territories are bounded by the Main, which there receives the Tauber. Except a part of the Bodensee, B. has no lake of importance. In the Schwarzwald, however, there are the following sheets of water which go by the name of lakes: Mummelsee, Wildsee, Feldsee, Titisee, and the Nonnenmattweiher, with a floating island.

Climate.—As the difference between the highest and lowest points of B.—Feldberg, which rises to a height of 4,860 ft. and Mannheim—amounts to something like 4,500

ft., there is a great variety of climate, especially in respect of temperature. The mean temperature of the plains may be stated at 50°, and that of the highlands as 44° Fahr., so that the Rhine valley of B. is one of the warmest and most fruitful districts, not only of Germany, but of Europe; the land yielding often, in the case of maize, a return of more than three hundredfold. Walnuts, cherries, apples, and pears grow in abundance, while the w. terraces of the Schwarzwald are decked with vines. The cereals are profitably cultivated at a height of at least 2,600 ft. Oats rise as high even as 3,600 ft., above which are the exclusively pastoral districts.

About two-thirds of the population are engaged in the cultivation of the land, which, as may be inferred from the description, yields rich returns. The chief agricultural products are wheat, oats, rye, barley, maize, potatoes, pulse, and vegetables of all sorts. Tobacco, hemp, rape, opium, etc., also yield large revenue. Meadow and pasturage occupy about a fifth of the surface. An important branch of cultivation is the production of chestnuts, walnuts, almonds, etc. The quantity of wine produced yearly is, on an average, 14 million gallons. The Schwarzwald is one of the most remarkable pine-forests of Germany. There whole tracts may be seen of pines of the height of from 160 to 180 ft., which are exported to the Netherlands for ship-building. The rearing of cattle is carried on largely. The several kinds of stock include horses, asses, cattle, sheep, goats, and swine. Honey is also an important product. Various societies exist for improving the breed of horses and perfecting agriculture.

Minerals.—The mineral wealth of the country does not seem to be valued yet as it deserves, if we may judge from the extent of mining operations carried on; but the activity of the Mining Society at Carlsruhe is yearly bringing this department of the national industry more and more into a fitting condition. Iron, lead, silver, copper, and salt are among chief productions; gold is extracted from the sands of the Rhine, near Wittenweier, and cobalt, sulphur, marble, and several kinds of precious stones are found. B. is rich in mineral springs; as many as 60 are enumerated, some sulphureous, some chalybeate, some acidulous. Hence there are a great number of much frequented watering-places, as Baden-Baden, Badenweiler, Griesbach, Petersthal, etc.

Manufactures, etc.—There is an increasing activity in the industrial field. The manufactured products are chiefly the following articles: ribbons and cotton fabrics, mostly at St. Blasia; toys and trinkets, and tobacco, which occupies the first place; chicory, paper, cloth, leather, beer, wooden clocks, and articles of straw; the last two are characteristic of the Schwarzwald districts, and known all over the world. Of clocks alone over 600,000 are made annually. The chief articles of export are wine and timber, which last is sent almost exclusively to the Netherlands. The principal imports are colonial goods, fruits,

drugs, horses, wool, cotton, silk goods, iron, steel, and articles of luxury. Money was formerly reckoned in guldens or florins, of 24 to the mark of silver, a florin being equal to about 40 cents; but now, under the new universal system of the German empire, in marks, approximately equal in value to English shillings, or U. S. quarter-dollars. Weights and measures are divided according to the decimal system.

Religion, Education.—The dominant church is the Rom. Cath. Other large denominations are the Protestants, Dissenters and Mennonites and Jews. The school system of B. is excellent; and there are a Prot. univ. at Heidelberg, a Rom. Cath. univ. at Freiburg, and numerous libraries, museums, and collections to promote the highest culture.

Government.—The sovereignty of the grand duchy, strictly indivisible and inalienable, is hereditary in the eldest of the male line, and, failing that, of the female. The heir-apparent is styled Hereditary Grand Duke, and the other sons and daughters are called Margraves and Margravines. The sovereign is limited by a parilamentary constitution. The parliament, which meets regularly every two years, consists of two chambers. The first chamber comprises the princes of the grand-ducal house, the heads of the seignorial families (seven princes and three counts), and of the nobility—on whom, when they possess hereditary property, under feudal tenure, to the value of $125,000 the king confers the rank of the high-nobility—the Rom. Cath. archbishop, and the Protestant prelate, two representatives of the universities, and eight members chosen by the grand duke, without regard to rank or birth. The second chamber consists of 63 representatives chosen for eight years, 22 for the cities, and 41 for the rural districts, giving one representative for about 21,540 inhabitants. As to the franchise, less regard has been paid in B. than elsewhere to the property qualification; every settled citizen and all state officials may take part in the nomination of electors, and may become electors; only representatives must either pay tax on a capital of 16,000 marks (abt. $4,000), or be in possession of an ecclesiastical or secular office bringing in at least 2,500 marks ($625). The highest deliberative and executive body in the country is the council of state. The grand duke is its president, and it is divided, since 1870, into the ministries—(1) of the Grand-ducal House, of Justice, and of Foreign Affairs; (2) of the Interior; (3) of Commerce. The expenditure, for 1900–1, was $37,723,000; the receipts for the same year $35,604,000; 26½ millions of florins were added to the public debt of the country by the events of 1848–9. The railway debt of Baden, which is the only debt of the duchy, in 1900 amounted to $79,341,537. The military affairs of B. are now exclusively regulated by the imperial power; the troops of B. form the major part of the fourteenth *corps d'armée* of the empire. There are three orders of knighthood, besides a medal for military service, and other deco-

rations of merit. The capital and residence of the sovereign is Carlsruhe; the capitals of the four 'circles' are Constanz, Freiburg, Carsruhe (formerly Rastadt), and Mannheim.

History.—The original inhabitants of B. were Alemanni. These fell under the dominion of the Franks, the conquerors of Gaul, and submitted at the same time to the Christian religion. Under their duke, Gottfried, they made repeated attempts to regain their independence, but in vain; and the dukedom of the Alemanni was abolished, 748, by Pepin the Little. In the 11th c., a Duke Berthold, said to have been a descendant of the Alemannian Gottfried, built the castle of Zähringen in Breisgau, and with him begins the unbroken line of the princes of the House of Zähringen. A descendant of his second son took the title of Margrave of B., and became the ancestor of the still flourishing House of Baden. He died 1130. The history of this house presents, for long, little else but a succession of partitions of the territories among brothers, to be again and again reunited by one or other of the collateral branches becoming extinct. The prosperity of the country was thus greatly retarded. The present cap., Carlsruhe, was built 1715 by the reigning count, Charles III. To his grandson, Charles Frederic, who succeeded 1746, B. owes considerable accessions of territory and political importance. By favoring the policy of Napoleon, and joining the Confederation of the Rhine, he doubled his possessions in extent and population, and acquired successively the dignity of elector and the title of grand duke. In 1811 he was succeeded by his grandson, Charles Ludwig Frederic, who, five years before, had married Stephanic Louise Adrienne Napoleone, an adopted daughter of Napoleon. After the battle of Leipsic, Charles Ludwig seceded from the Confederation of the Rhine, and (1815) joined the German Confederation, in which B. holds the seventh rank.

The original constitutions or 'states' of the separate territories composing the grand duchy having mostly become extinct, the grand duke Charles granted (1818) the charter which forms the basis of the present constitution. Charles was succeeded in the same year by his uncle Ludwig, who was inclined to absolutism, and had to contend at first with a powerful opposition, which led him frequently to dissolve the Chambers. He succeeded, 1825, in carrying through an alteration of the constitution, extending the duration of the parliaments; after which the government and the Chambers acted more harmoniously. Ludwig dying childless (1830), was succeeded by his brother Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional government; but the tide of reaction, become strong since the fall of Warsaw, soon seized the government, and the act establishing the freedom of the press, which in 1831 had been hailed with delight by B. and the whole of Germany, was, in 1832, declared impracticable and abrogated. A fluctuating contest between a reactionary government and

a growing opposition was carried on till 1846, when the constitutional Bekk was made minister of the interior, and liberalism thus placed at the helm. The first effect was to calm the public mind, and to cause a split between the liberals and the radicals. The ninth parliament met (1847, Dec.) under the most friendly and promising auspices; when the French revolution (1848, Feb.), the vibrations of which were felt first by B., suddenly called the radical party into the most violent activity. Not satisfied with a multitude of liberal measures passed by the legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The troops having sided with the insurgents, the grand duke fled, and a Constituent Assembly was called (1849, May). The duke had recourse to Prussian aid, and after several battles, was reinstated on his throne (1849, July). The restoration was followed by some thirty executions, consisting chiefly of soldiers that had borne arms against the government, and of a few political leaders. Upon the whole, the reactionary tendency has been less marked in B. than in most other German states, and many valuable reforms effected in 1848 have been retained. Baden has shared in recent German political and ecclesiastical disputes, especially with regard to Rom. Cath. opposition to liberalism. Yet among the improved conditions are the separation of church and state; secularization of elementary education; admission of Jews to full civic rights; and increased freedom of trade. The struggle, 1859, between the church party and the state resulted at first in favor of the church party, but, two years later, the recognition of the independence of the Rom. Cath. Church included that of the Prot. also. In the Austro-Prussian war of 1866, B. was against Prussia, and had a heavy share in the defeat; but in the Franco-German war 1870–1, B. fought with vigor against France, and became a part of the renewed German Empire. See GERMANY.

Population.—Pop. (1890) 1,657,867; (1900) 1,867,944; 1,131,639 being Rom. Catholics, 704,058 Protestants and 26,132 Jews.

BADEN, TORKEL: 1765–1804; b. at Fredericksburg; a Danish philologist, who took his course of studies mostly in Germany, received the degree of Doctor of Philosophy at Göttingen (1789), and was appointed prof. of elocution at the Univ. of Kiel (1794). His principal works are: *De eloquentia Paulina* (1784); *De ara deo ignotodicata* (1786); *De causis neglectæ a Romanis tragœdiæ* (1789); *Commentatio de arte ac judicio F. Philostrati in describendis imaginibus* (Copenhagen, 1792); *Briefe über die Kunst von und an Hagedorn* (Leipzig, 1797); etc.

BA'DEN-BADEN: town in the grand duchy of Baden; in a pleasant valley at the base of the Black Forest; celebrated chiefly for its medicinal springs, which were known in the time of the Romans. L. having been a fashionable place of resort so early as the days of Antoninus and Aurelius, numerous Roman antiquities have been found in the

neighborhood, and are preserved in a museum here. There are several saline springs, varying in temperature from 117° to 154° F. These springs are impregnated with iron, magnesia, and lime, with sulphuric and carbonic acid, and are especially recommended in chronic cutaneous diseases, gout, rheumatism, etc. The chief spring discharges in 24 hours about 4,200 cubic ft. of water. The gaming-tables of B., the most renowned in Europe, were closed with the rest of the licensed German gaming-houses in 1872. Pop. (1900) 15,718, but the visitors during the season, which is at its height in July and August, are often double this number.

BA'DEN BEI WIEN, *bī vēn* (i.e., 'Baden near Vienna'): much frequented watering-place of Lower Austria, about 15 m. s.s.w. of Vienna; the *Aquæ Pannonicæ* or *Cethiæ* of the Romans; still famous for its warm mineral springs, frequented during the season by from 12,000 to 15,000 persons chiefly from the Austrian capital. The temperature varies from 90° to about 99° F. The baths are frequented by persons of both sexes, who in the bath promenade arm in arm. Many of the Austrian nobility have palaces here. The favorite walk in the neighborhood is along the romantic valley, the Helenenthal. Pop. 17,000.

BADEN-POWELL, *bāy'dĕn-pow-ĕl*, Sir George Smyth, K.C.M.G., F.R.S.: publicist and political agent: b. Oxford, Eng., 1847, Dec. 24; d. 1898, Nov. 20. He graduated with distinguished honor at Oxford, 1876, having previously spent 3 years in travel through Europe, India, and Australasia, and published economic and political treatises of great value. He was private sec. to the gov. of Victoria 1877; spent 1880–1 in W. Indies, studying their economic situation, and returned there 1882 as govt. agent; was employed in diplomatic negotiations with native chiefs in Bechuanaland 1885; in Brit. America 1886; Malta 1887; was Brit. expert agent at the Bering Sea Tribunal 1893. He was author of *New Homes for the Old Country* (1872), a storehouse of information about Australia; *Protection and Bad Times* (1879); *State Aid and State Interference* (1882); *The Truth About Home Rule* (1888); *The Land Systems of India* (1892); etc. He was a member of Parliament from Liverpool from 1885 till his death.

BADEN-POWELL, Robert Stevenson Smyth: British military officer; b. London 1857, Feb. 22. joined the 13th Hussars 1876; as adjutant served with his regiment in India, Afghanistan, and South America; assistant military secretary at Cape Town in 1887–89, during which time he took part in the Zululand operations; at Malta in 1890–93; returned to Africa in the latter year and was given charge of raising and commanding the native levies in the Ashanti operations, and for his brilliant work was brevetted lieutenant-colonel; was chief staff officer in the Matabeleland campaign; brevetted colonel and placed in command of the 5th Dragoons in 1897. In the beginning of the war with the Boers (1899–1901) he was ordered to

South Africa to raise a military force there and drill it into efficiency. During the war he signally distinguished himself by his grand defence of Mafeking, Cape Colony. In recognition of his services Queen Victoria promoted him to major-general. In 1903 Baden-Powell visited the U. S. to study American cavalry tactics and methods, during which time he visited the U. S. Military Academy and other military establishments. He published several works including *Reconnaissance and Scouting* (1890); *Vedette* (1890); *Cavalry Instruction* (1895); *The Downfall of Prempeh* (1896); *The Matebele Campaign* (1896), etc.

BADENI, *bâ'dĕn-ē*, Count Cassimir Felix, Austrian statesman: b. Poland 1846, Oct. 14. His father, though poor, was a man of intellect, and was made a count by the king of Poland just before the birth of Cassimir. He also fell heir to a fortune, and his two sons received a university education. Cassimir entered the Austrian civil service; became district chief at Zolkiew in 1871; minister of the interior in 1873; governor of Galicia in 1888; and prime minister of Austria-Hungary, 1895, Sept. 15. In 1897, April, because of inability to maintain a Liberal majority in the newly elected Reichsrath, he resigned with his cabinet, but the emperor declined to accept his resignation, and he remained in office until November 28, when he again resigned and a new cabinet was organized. The principal feature of his administration and the one which not only caused his fall, but a long period of political agitation, was his introduction of what is known as the 'language ordinance,' which allowed the official use of the Czech language in Bohemia and Morazia. This measure alienated the Germans and provoked a racial conflict of a most bitter character between them and the Czechs.

BADENWEILER, *bâ'dĕn-vī-lĕr*, a watering place in the grand duchy of Baden, near Müllheim. Its mineral springs are now rated among the indifferent waters, and it is of interest chiefly for the ruins of Roman baths that were discovered in 1847. The foundation of the town is referred to the time of Hadrian, and the remains of the vapor baths, of which there are excellent specimens, are supposed to be of the same period. The ruins show a division for men and for women, each having a large outer court opening into a dressing-room; there is the hot-air bath, the warm bath, and the cold bath. The walls and steps are in their original position. The whole structure is 318 feet by 90 feet.

BADGE: in general, any honorary decoration; either conferred by the state or sovereign, or assumed by the family for purposes of distinction. Of badges conferred for the purpose of inciting to exertion, and gratifying honorable ambition, instances are the garter of the English knight, the golden fleece of the Spanish grandee, and the button of the Chinese mandarin. Among the ancients, one of the most usual emblems of authority was a gold ring, worn generally on the fourth finger. A ring of this description was the mark of senatorial and magisterial dignity.

BADGE, THE JEW.

Of badges assumed for the purpose of distinction, none are more famous than the white and red roses of York and Lancaster. Henry VII. combined these two emblems first carrying a rose per pale, white and red, afterward placing the white rose within the red one. The *bear and ragged staff*, which still exists as a sign in London was the B. of the great Earl of Warwick. The *white hart* and *silver swan*, frequent signs to inns, have a similar origin, the first having been the B. of Richard II., and the second having belonged to the House of Lancaster. In the United States, badges, usually emblematic, indicate membership in the great societies, many of which are held in high honor from their historic associations and their beneficent work.

Different countries also have distinctive badges, usually connected with the history either of the ruling or of some former dynasty; examples of such badges are the *fleur de lis* of France, and the other badges for which it from time to time makes way—viz., the cap of liberty and other emblems of republicanism, the eagles of the empire, borrowed from Rome, and the bees and other insignia which the Bonaparte family have assumed. One of the oldest and most celebrated badges in existence is the so-called jewel of King Alfred.—For the badges of different orders of knighthood, see their respective titles. See also DEVICE: CREST: COCKADE: MOTTO: RING: SIGNET: HERALDRY.

BADGE, THE JEW: a distinguishing mark on the dress of Jews of both sexes and all ages, made a general order of Christendom in 1215 by the Fourth Lateran Council at instigation of Innocent III., intended to prevent social intercourse between Jew and Christian. Such a law was in vogue in Islam as early as 640 when Jews were compelled to wear a yellow seam on their upper garments, while in 1005 the Jews of Egypt had to wear bells on their garments and a wooden calf in reminder of the golden one —in later years they had to don yellow turbans. In the Romance countries the badge consisted of a ring sewn on the upper garment and of a different color, called 'the wheel;' and the state followed the church in its imposition from Saint Louis in 1269 down to Charles VI. The age at which it was to be borne varied from seven to thirteen and fourteen in France. It was usually worn upon the breast and of varying size; the color at first a saffron yellow became under King John parti-colored red and white. A fine was imposed if a Jew was found without the badge, for whose use the Jews had to pay an annual sum. In the various kingdoms of Spain the badge does not seem to have long been prescribed. However as late as 1415, May 11, a bull of Benedict XIII. ordered the Jews to bear a yellow and red badge, the men on the breast, the women on the forehead. In Italy it was less the custom, being known only in Sicily in the 13th century, but in the 14th and 15th centuries elsewhere. From its shape it was known as the

'O' and often was accompanied by the pointed hat. In England Stephen Langton imposed the mark on the Jews, in 1222, in the form of a band, first white, and later yellow, two fingers broad and four long; in 1274 under Edward I. its shape was that of the tables of the law. In Germany, where the earliest mention of the badge is at Erfurt, 1294, Oct. 16, the hat was the chief mark of identification although the yellow badge was generally introduced later. In Hungary (1279) the badge was placed on the left breast. In Switzerland (1435) it took the form of a bit of red cloth shaped like a pointed hat. While the Jews in Spain, Italy, and Southern France were long able to resist the inflection of the badge, owing to their power and prominence, the effects produced by such a mark, which branded the Jew as a pariah, were much to be deplored. They disfigured the Jewish character and increased popular odium. See Abrahams' *Jewish Life in the Middle Ages*, Chap. XVI.

BADGER, n. *bǎj'ėr* [OF. *bladier*, a corn-dealer—in allusion to some of the habits of the *badger*—from mid. L. *bladārĭŭs*, a seller of corn]: a well-known nocturnal animal which burrows in the ground, formerly baited with dogs: V. to pester; to tease or annoy. BAD'GERING, imp. BADGERED, pp. *bǎj'ėrd*. BADGER, n. in OE., a pedlar; a corn-factor: V. to beat down in a bargain. BADGER-LEGGED, a. *-lĕgd*, having legs of unequal length, as those of the badger are popularly supposed to be.

BADGER, *bǎj'ėr* (*Meles*): genus of quadrupeds of the Weasel family, *Mustelidæ* (q. v.), and included by Linnæus in the genus *Ursus* or Bear, but forming a sort of connecting-link between this family and the *Mustelidæ* or Weasel and Otter family. To the Skunks (q. v.), which are ranked in that family, the badgers have a particularly strong resemblance, and their dentition and habits are almost the same. The dentition of badgers differs from that of bears chiefly in the large size of the tuberculous molar teeth at the bottom of each jaw, showing a still greater adaptation to vegetable food. Badgers, like the rest of the family to which they belong, are plantigrade, i.e., they walk on the whole sole of the foot, and not merely on the forepart of it. The body is thus brought nearer to the ground than it otherwise would be from their length of limb. The head is long, with a pointed muzzle, the tail short, the skin very thick and tough, the hair long. The gait is slow, the habits nocturnal and solitary. There are five toes on each of the fore and hind feet, and the feet are peculiarly adapted for digging and burrowing. The B. is extremely cleanly in its habits. It is one of the most perfectly omnivorous of animals, in a wild state as well as in confinement; fruits, roots, beech-mast, eggs, young birds, small quadrupeds, frogs, snails, worms and insects, equally constitute its natural food. It has been known to visit a garden for strawberries. It is fond of honey, and of the larvæ of wasps and wild bees, for the sake of which it digs up their nests, its hide being impervious to their stings

It is often caught by placing a sack in the mouth of its hole, when it is out at night; dogs are then sent into the wood to alarm it, upon which it flees to its hole. Dogs sent into the hole are often foiled by earth which the B. throws back upon them, to block up their way, nor is it easy for a dog to contend with it, owing to its great strength, and particularly the strength of its jaws. A barbarous sport called Badger-baiting, or *drawing the badger*, was formerly an attraction to public houses of the lowest sort. A badger kept in a barrel was assailed by dogs, and at last yielding to superior number, was dragged out, upon which it was released, and allowed to go back to recover itself, and be baited again, which happened several times daily. This practice was the origin of the verb to *badger*, expressive of persevering annoyance by numerous assailants. The flesh of the B. is said to be agreeable food, particularly when cured in the form or hams. It is much used in China. The B. is easily domesticated when taken young, and becomes very familiar. In Scotland and the n. of England, a B. is still called a *Brock*, its Anglo-Saxon name; and in some parts of England it is termed a *Grey*, from which some derive greyhound.—The Balysaur of India, also called the Sand Bear and Indian B. (*M. collaris*), very much resembles the common B., but is taller, and has a more hog-like muzzle, and a longer tail. Its habits and its food are similar to those of the common B., and when attacked it defends itself with great vigor. It is found chiefly in hilly districts.—The American B. (*Taxidea Americana*) was supposed to be a mere variety of the European B., but has proved to be very distinct, so that it is now regarded by all naturalists as worthy of a separate genus (*Texidea*), and is sometimes called *Taxel*. Its teeth are more adapted than those of the B. for carnivorous subsistence, and it preys chiefly on small animals, such as marmots, which it pursues into their holes in the sandy plains near the Missouri and the Rocky Mountains. It abounds in that region over a considerable range (notably in Wis.), but is not known in Labrador, so that its former name is perhaps the perpetuation of an error. In its pursuit of the smaller quadrupeds upon which it preys, it enlarges their burrows, and renders some parts of the plains dangerous to persons on horseback. Its prevailing color is hoary gray in winter, yellowish brown in summer, the under parts generally yellowish white: a white stripe runs from the nose over the forehead to the neck. The hair becomes not only very long but woolly in winter. The burrowing powers of this animal are extraordinary. It sometimes makes burrows six or seven ft. deep, running under ground to a length of 30 ft.

BADG'ER, *bǎj'ėr*, George Edmund, American statesman; b. Newbern, N. C., 1795, April 13; d. 1866, April 13, was graduated at Yale College in 1813; became a lawyer at Raleigh; and was judge of the North Carolina Superior court in 1820–5. He was appointed secretary of the navy. 1841, March 14, resigning after the death of President

Harrison, and was elected to the United States Senate in 1846 and 1848. In 1853 he was nominated for justice of the United States supreme court, but was not confirmed. He served in the State convention called to pass on the question of secession, although opposed to such measure, and after making a strong speech in defense of the Union, was afterward known as a member of the Conservative party.

BADG'ER, Oscar L.: American naval officer: b. Windham, Conn., 1823, Aug. 12; d. 1899, June 20; entered the United States navy, 1841, Sept. 9, became lieutenant-commander, 1862, July 16, commander, 1866, July 25, captain, 1872, Nov. 25, commodore, 1881, Nov. 15, and was retired 1885, Aug. 12. He served on the steamer Mississippi during the Mexican war, taking part in the attack on Alvarado, 1846; led the party that attacked and destroyed the village of Vutia, Fiji Islands, while on the sloop John Adams, 1855–6; and in the Civil War commanded the Anacostia, of the Potomac flotilla, 1861–2, and the ironclads Patapsco and Montauk, in the operations in Charleston harbor in 1863; and was acting fleet captain on the flagship Weehawken in the attack on Fort Sumter, 1863, Sept. 1.

BADGHIS, *bâd-gēz':* a region north of Herat, comprising the country between the Murghab and the Harirud rivers. It lies to the south of the boundary line between Afghanistan and the Russian territories, as defined in 1887.

BADG'LEY, *băj'lē*, Sidney Rose: Canadian architect: b. near Kingston, Ont., 1850, May 28. He studied architecture in Toronto, and, after practising some time in St. Catharines, established himself in Cleveland, O. He has made a specialty of the architecture of churches and public buildings, and has planned and erected churches in almost all parts of Canada and the United States, and, among other structures, the Massey Music Hall, Toronto; the Slocum Library and Perkins Observatory, in Ohio; Wesleyan University, in Delaware, and the Medical College, Cleveland. He published an *Architectural Souvenir* (1896).

BADHAM, *băd'ăm*, Charles: English educator: b. Ludlow, 1813, July 18; d. 1884, Feb. 26, was considered one of the most eminent classical scholars of his day; and after serving for several years as head master of King Edward VI.'s Grammar School at Louth, he became professor of classics and logic in the University of Sydney, Australia, 1867. While in Sydney he established a system of teaching by correspondence, similar to the present university extension scheme. He published a number of works on Greek classics, and *Criticism Applied to Shakespeare* (1846).

BADIAGA, n. *băd-ĭ-ā'ga* [Russ. *badyaga*]: genus of seaweeds belonging to the family or section *Amphibolæ*. The powder of one species common in the n. of Europe is used to take away the livid marks left by bruises.

BADIAN, n. *bā'dĭ-ăn* [an Indian name]: aromatic car-

sules or seeds much used in the East for flavoring food. See ANISE: ILLICIUM.

BADIA-Y-LABLICH, *bâ-dē'â-e-lā-blēk'*, DOMINGO; known also by the name Ali-Bei-el-Abbassi: 1767, Apr. 1—1818, Aug. 30; b. Barcelona, Spain: one of the most enterprising of modern travellers. He studied Arabic, also physical science and mathematics at Valentia. Having formed the project of visiting Africa and Asia, under the disguise of a Mussulman, for the purpose of avoiding the suspicions of the natives when visiting those places forbidden to Christians, he resigned an office under government, 1797, gained promise of official support at Madrid, prepared himself by study in London, and even underwent the ordeal of circumcision. In 1803, he sailed for Africa, where he represented himself, under the name Ali-Bei, as a descendant from the Abbasides. His tact and talents gained for him such esteem that he was invited to the court of the emperor of Fez and Morocco. After a two years' residence in Morocco, he set out on a pilgrimage to Mecca, 1805, and after sojourning some time in Tripoli, Cyprus, and Egypt, arrived at the holy place, 1807, being the first Christian that had visited it since the institution of Islam. Subsequently, he visited Jerusalem and the chief places in Palestine and Syria, and in the autumn of 1807 arrived at Constantinople, whence he had soon to flee, the reality of his Mohammedanism being suspected. After his return to Spain, he was made intendant of Segovia and prefect of Cordova; but the easy way in which he shelved his patriotism, and submitted to the French conquerors, was fatal to his prospects, for, on the expulsion of the latter, he was compelled to leave the country. He went to Paris, where, 1814, he published an account of his travels under the title *Voyages d'Ali-Bei en Afrique et en Asie pendant les Années* 1803 *à* 1807. His work was translated into most of the European languages. Four years after the publication, B. set off on another journey to the East, but died suddenly at Aleppo, and the pacha of Damascus seized his papers.

BADIERA, n. *băd-ĭ-ēr'a* [from *Badier*, a French botanist, who collected plants in the Antilles]: genus of plants belonging to order *Polygalaceæ*. *B. diversifolia* is the Bastard Lignum Vitæ of Jamaica.

BADIGEON, n. *băd'ĭ-zhŭn* [F.]: a preparation of sawdust, slaked lime, powdered stone, and alum, for coloring the walls of houses; a mixture of plaster and free-stone used by sculptors in repairing defects in their work; a kind of cement used by joiners, etc.

BADINAGE, n. *băd'ĭ-nâzh* [F. a joke—from *badiner*, to jest, to make merry]: banter; playful talk.

BADISTER, n. *bă-dĭs'tĕr* [Gr. *badistes*, a walker, a goer—from *badizo*, to walk slowly]: genus of predatory beetles belonging to the family *Harpalidæ*.

BADIUS, a. *bād'ĭ-ŭs* [L.]: in *bot.*, chestnut-colored; brown.

BADMINTON, n. *băd'mĭn-tŏn* [after the Duke of

Beaufort, of *Badminton*, whose favorite drink it was]: a cup of claret wine, spiced and sweetened; a favorite drink of sporting men.—B. is also a game, predecessor of, and closely resembling lawn tennis (q.v.); played with battledore and shuttlecock on a rectangular portion of a lawn. The ground is divided crosswise by a strip of net, not less than three inches wide, suspended from poles at a height of five feet. As in lawn tennis, the ground on either side of the net is divided lengthwise into right and left courts. The first player standing on a specified part of his right court, must strike the shuttlecock so as to fall across the net into the back section of the right court opposite. The opponent strikes it back, then it is returned by the first player, and so on till the first player misses the shuttlecock. After the first stroke it suffices that the shuttlecock be sent across the net, if it does not fly beyond the boundaries.

BADRINATH: see BHADRINATH.

BÆCKIA, n. *bēk'ĭ-a* [from Abraham Beck, physician to the king of Sweden]: genus of plants belonging to the order *Myrtaceæ*, or Myrtle-blooms; natives of Australia and China.

BAEL, or BHEL: see AEGLE.

BAENA, *bâ-ā'nâ:* town in the province of Cordova, Spain; abt. 24 m. s.s.e. from Cordova, on the river Marbella. It has considerable export and inland trade, chiefly in grain and oil. B. was a Roman town; and a Roman sepulchre was discovered here in 1833. Pop. abt. 13,000.

BÆOMYCES, n. *bē-ŏm'ĭ-sēz* [Gr. *barios*, small; *mukes*, mushroom fungus]: genus of lichens, much resembling minute fungi.

BAER, *bair*, KARL ERNST VON: distinguished Russian naturalist: 1792, Feb. 29—1876, Nov. 29; b. Esthonia. He studied medicine at the Univ. of Dorpat, and in Germany he studied comparative anatomy under Döllinger in Würzburg. He was appointed prof. of zoology at Königsberg, 1819; was called to St. Petersburg, 1834, and was soon known as one of the most active members of the Academy. As a naturalist, he has occupied himself specially with embryology; and to his laborious investigations are due several most valuable discoveries in regard to the development of organic bodies. Beginning with his *Epistola de Ovi Mammalium et Hominis Genesi* (Leip. 1827), he still further elucidated this subject in his *History of Animal Development* (Königsberg, 1828–1837) and *History of the Development of Fishes* (Leip. 1835). After his return to St. Petersburg, he made the polar regions the objects of his study. He examined carefully the n. shores of Russia, and published a minute description of their fauna and flora. He suggested valuable improvements in the Russian fisheries. In 1864, the fiftieth year of his doctorate was celebrated by the Esthonian nobility, at whose expense a splendid volume was published, containing B.'s autobiography. His *Reden* and *Kleine Aufsätze*

appeared 1864–75; the *Beitrage zur Kenntniss des Russischen Reichs* (26 vols.) 1864–75.

BAER, *bär*, WILLIAM JACOB, artist: b. Cincinnati, 1860, Jan. 29. He studied at the Munich Royal Academy, 1880–4, receiving four medals there, and one of his works was purchased by the Academy. Between 1885 and 1892 he painted portraits and pictures, the latter chiefly in the genre style. He then devoted himself almost exclusively to miniature painting, of which be became a pioneer of the modern school. *Aurora*, *The Golden Hour*, *In Arcadia*, and *The Madonna with the Auburn Hair* are among his best-known miniatures.

BAETIS, n. *bā-ē'tĭs* [L. *baetis*]: genus of insects belonging to order *Neuroptera* and family *Ephemeridæ*. They have four wings and two setæ.

BAEZA, *bâ-ā'thâ:* handsome old town of Spain, province of Jaen. Here the younger Scipio routed Asdrubal with immense loss, taking 10,000 Spaniards prisoners. It was a flourishing city under the Moors, several of whose caliphs and kings resided here, but it never fairly recovered its sack by St. Ferdinand in the 13th c. Its principal buildings are the univ., the old monastery of St. Philip de Neri, the cathedral, and the Jesuits' college. B. has manufactures of leather. Pop. 14,300.

BAFFA, *bâf'fâ*, the *Paphos* of ancient times: seaport town on the s.w. coast of the island of Cyprus. It has fallen much into decay, having a small trade in cotton, silk, and grain; but under the Venetian rule, it was of considerable importance. The present town occupies the site of New Paphos, which under the Romans, was a beautiful city, with fine temples and other public buildings.

BAFFETAS, n. *băf'fĕ-tăs*, or BAFTAS, *băf'tăs*, or BASTAS, *băs'tăs* [possibly from Per. *bafti*, woven, wrought]: a plain muslin brought from India.

BAFFIN'S BAY, *băf'ĭnz:* a gulf, or rather sea, on the n.e. coast of N. America, between that continent and Greenland: lat. 68° to 78° n., long. 51° to 80° e.; abt. 800 m. long, with an average breadth of 280. Its greatest depth is 6,890 ft. The tides do not rise more than 10 ft. The surface of the sea is covered with ice during the greater part of the year, which extends from shore to shore in winter, though possessing a slow southward movement. In spring and summer, the great mass, known as the middle ice, begins to move less slowly southward, leaving navigable passages on the side of Greenland and America, and occasional channels, or crossings between these coasts. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. The prevailing rocks are granite and gneiss; the principal animals inhabiting the coasts are, on land, bears, black foxes, and hares; in the sea, the black whale, walrus, and seal, gulls, ducks, and other sea-fowls. There are Danish settlements in Disco and Whale islands.

Baffin's Bay communicates with the Atlantic Ocean by Davis' Strait, and with the Arctic Ocean by Smith Sound on the n., and Lancaster Sound on the w. Wellington Strait, the n.w. outlet of Lancaster Sound, was entered, 1852, by Sir E. Belcher. Baffin's Bay was first explored, 1616, by William Baffin, after whom it was called, and who was pilot of the expedition commanded by Bylot. Baffin's title to this honor seems to have been most faithfully earned; and the accuracy of his observations and descriptions have been confirmed by subsequent navigators. Whale and seal fishing are prosecuted to a large extent in Baffin's Bay, which, on account of ice, is navigable for only about two months in summer.

BAFFLE, v. *băf'fl* [Norm. F. *beffler;* OF. *baffer,* to deceive or mock: F. *bafouer,* to ridicule or disgrace: Swiss, *bafeln,* to talk idly: It. *beffare,* to jeer]: to foil or render ineffectual the efforts of another; to escape detection; to elude; to confound; to defeat; in *OE.,* to disgrace; to treat as an object of contempt. BAFFLING, imp. *băf'fling:* ADJ. causing disappointment; shifting constantly from one point to another, as baffling winds. BAFFLED, pp. *băf'fld.* BAF'FLER, n. *-flĕr,* one who. *Note.*—BAFFLE is used in the two senses of 'to foil efforts,' and in *OE.,* 'to disgrace,' which latter sense is really derived from independent root-words: Scot. *bauchle,* to treat contemptuously.—SYN. of 'baffle': to defeat; disconcert; confound; frustrate; discompose; foil.

BAG, n. *băg* [F. *bague,* in the old sense, a parcel or bundle: mid. L. *baga,* all one's movable property: Gael. *balg,* a leather bag or wallet: Ger. *balg,* the skin of an animal]: the skin of an animal stripped off whole; a sack; a pouch; a purse; the udder of a cow; the stomach: V. to put into a sack; to puff up or out. BAG'GING, imp.: N. the cloth or coarse materials for making bags; the act of putting into bags. BAGGED, pp. *băgd.* BAGGY, a. *băg'ĭ,* resembling a bag; loose and full like a bag. BAG'MAN, n. in *familiar language,* a person employed to solicit orders for a manufacturer; a commercial traveller. TO GIVE ONE THE BAG, in *OE.,* to cheat; to deceive; *colloquially,* to dismiss from employment. BAG AND BAGGAGE, everything a person possesses—see BAGGAGE 1. BAG-NET, a net for catching fish, shaped like a bag. BAG'-REEF, n., a fourth and lower reef used in the British navy. BAG'GING-TIME, n., baiting time; feeding time.

BAGARIA, *bâ-gâ-rē'â,* or BAGHERIA, *bâ-gā-rē'â:* town of Sicily, province of Palermo, nine m. e. by s. from Palermo, with which it is connected by railway; beautifully situated at the base of the isthmus which separates the Bay of Palermo from that of Termini, and is surrounded by groups of palatial villas of the Sicilian nobility, abandoned after the proprietors had ruined themselves by the festivals here celebrated in honor of Queen Caroline, at the commencement of the present century. Pop. abt. 12,000.

BAGASSE, n. *bă-găs'* [F.—from Sp. *bagazo,* the remains

of pressed sugar-canes, grapes, etc.], or CANE STRAW, or CANE TRASH; in the Antilles, called BAGAUZ, n. *bă-gawz′:* refuse matter obtained during the expression of the saccharine juice from the sugar-cane. In the manufacture of sugar (q.v.), the sugar-canes, in lengths of 3 to 4 ft., are passed between heavy rollers, which only partly squeeze out the juice, and yield the bruized canes, or B., still retaining a large percentage (usually about 18) of sugar. The only use to which the B. is put is as fuel in the heating of the boilers and pans in the sugar manufactory. The improved apparatus introduced of late years has done much to save the large amount of sugar wasted in the B. and in other parts of the process, which at one time amounted to not less than one-half of the entire quantity of sugar in the sugar-cane.

BAGATELLE, n. *băg′ă-tĕl* [F. *bagatelle,* a trifle—from It. *bagattella,* a trifle, nonsense: F. *bague,* a trifle]: a trifle; a thing of no importance; name of a game somewhat resembling billiards. A B.-table is usually about 7 ft. long and 21 inches broad; it is lined with cloth, and a game is performed on it with small ivory balls and a cue or mace. The sport consists in striking one or more of the balls into numbered holes at one end of the board.

BAGATY, n. *băg′a-tĭ,* or BAGGETY, *băg′ĕt-ĭ* [Eng. *bag* suggested by the gibbous aspect of the fish]: female of the Lump-fish, or Sea Owl, *Cyclopterus lumpus.*

BAGAVEL, n. *băg′-a-vĕl* [AS. *bycgan, bycgean,* to buy *gavel,* tax]: a tribute granted to the citizens of Exeter by a charter from Edward I., empowering them to levy a duty upon all wares, brought to that city for the purpose of sale, the produce of which was to be employed in paving the streets, repairing the walls, and the general maintenance of the town.

BAGDAD, *bâg-dâd′:* a pachalic in the s.e. of Asiatic Turkey; extending from lat. 30° to 38° n., and from long. 40° to 48° e.; bounded on the n. by the pachalics of Diarbekir and Van; on the w. and s. by Syria and Arabia; and on the e. by Persia; while at its s.e. extremity lies the Persian Gulf. Extreme length, 550 m., breadth, 350. It is watered by the rivers Euphrates and Tigris, which unite their streams at the town of Korna, lat. 31° n., and long. 47° e. The pachalic is usually divided into three parts. 1. That e. of the Tigris, comprehending the district of *Khuzistan* (anciently, *Susiana*) and *Kurdistan* (part of ancient Assyria), the former rich in grain and fruit. 2. That w. of the Euphrates, a sterile waste, losing itself at last in the great Syro-Arabian desert. 3. That between the two rivers, the n. portion of which is known under the name of *Algesirah,* or 'the Island' (anciently, *Mesopotamia*), and the s. under the name of *Irak-Arabi* (anciently, *Babylonia* and *Chaldæa*). The last of these divisions, though now a barren wilderness, was in anient times luxuriantly fertile, the seat of mighty empires, and inhabited by industrious populations. See ASSYRIA: BABYLON: NINEVEH: CTESIPHON: SELEUCIA:

etc. The barbarous misgovernment and wretched incapacity of the Turks have reduced it to its present condition. The pachalic produces, in the better-cultivated districts, crops of rice, wheat, maize, barley, with some hemp, flax, tobacco, etc., and dates are brought to great perfection. The chief wild animals are lions—not numerous—hyenas, jackals, wolves, gazelles, ostriches; the chief domestic ones are horses, asses, mules, buffaloes, camels, and dromedaries. The inhabitants are composed of Turkomans, Armenians, Turks, Jews, Arabs, and Kurds.

BAGDAD: cap. of the pachalic of the same name; on both banks of the Tigris, lat. 33° 20′ n., long. 44° 23′ e. The city is surrounded by a brick wall, 5 m. in circumference; the two parts are connected by a bridge of boats, and the communication is guarded by a citadel. It has an extremely picturesque appearance from the outside, being encircled and interspersed with groves of date trees, through which one may catch the gleam of domes and minarets; but it loses its beauty on closer inspection. The streets are narrow, crooked, unpaved, and dirty, full of ruts, and strewed with dead carcasses, which, however, are for the most part removed by dogs, the only public scavengers in the East. The exterior of the individual houses corresponds with the repulsive aspect of the streets. They have, in general no windows towards the front, and are built of old brick; but their interior is often very gorgeously decorated. The vaulted ceilings, rich moldings, inlaid mirrors, and massive gilding bring back to the recollection of the traveller 'the golden time of good Harun Al-Raschid.' B. contains upwards of 100 mosques. These, with the khans, bazaars, and the palace of the governor, are the only noticeable buildings in the city. The domes and minarets are said to be finer than those of Constantinople, and are beautifully painted. Bagdad long commanded a large part of the traffic between Europe on the one hand, and Persia and India on the other. The Persian and Indian trade is still considerable, as also that with Europe, a large portion of it being carried on by steamers up and down the river. The trade with Europe was formerly more largely by land, passing through the Syrian Desert to Damascus, or by way of Armenia northward. Since the opening of the Suez Canal the sea routes are of far more importance. Wool is the chief export to Europe, others being wheat, gum, galls, dates, etc. Of the inhabitants, the greater part are Turks and Arabs; the remainder are Jews, Armenians, Hindus, Afghans, and Persians. In summer, the heat is oppressive; rain does not fall on more than twenty or thirty days in the year; but when the snows melt on the Armenian hills, the Tigris becomes a majestic, and often a destructive, river. In 1831, an inundation destroyed one-half of the town, and several thousand lives.

B. was founded by Nebuchadnezzar, whose name and title on each brick composing a wall were discovered by

Rawlinson 1848. In the 9th c. it was enlarged by Harun Al-Raschid, who erected numerous edifices on the e. side of the Tigris. A hundred years later, B. was ravaged by the Turks. In 1253, the grandson of Genghis Khan, Hulaku, put an end to the old caliphate; but the descendants of this Tatar conqueror were expelled by Timur, who took the city 1393. After several vicissitudes, it remained in the possession of a Turkoman chief, whose dynasty governed until 1470. In the beginning of the 16th c., Shah Ismael, founder of the Suffide dynasty in Persia, made himself master of it; since which period it has repeatedly been a bone of contention between Turks and Persians. After a memorably obstinate siege, it was conquered by the sultan, Murad IV., 1638. Pop. estimated 60,000–150,000.

BAGEHOT, *bāj'ŏt*, WALTER, English economist and journalist; b. Langport, Somerset, 1826, Feb. 3; d. 1877, March, 24. He entered University College, London, in 1842, and after gaining great distinction in mathematics and philosophy he took the degree of M.A. in 1848. Four years later he was called to the bar, but instead of practising he went into business. He was one of the editors of the *National Review* (1855–64), and from 1860 till his death he was editor and part-proprietor of the *Economist*. His chief works are: *The English Constitution* (1867); *Physics and Politics* (1872); *Lombard Street* (1873), a study of the money market; and *Literary, Biographical, and Economic Studies* (1878–80), edited by R. H. Hutton.

BAGGAGE, n. *băg'gāj* [F. *bagage*, luggage—from OF. *bagues*, goods: compare OF. *baguer*, to truss, to tuck up]: all the articles necessary for a traveller, or for an army; luggage; things required for a journey. See LUGGAGE. In the marching arrangements of an army, B. is placed under strict rules, in order that the accumulation of weight may not impede the movement of the troops; and similar rules are enforced in troop-ships. The term itself is made to apply chiefly to articles of clothing, and to small personal effects.

BAGGALA, n. *băg'ga-la* [Arab. *budgero*]: a two-masted boat, more generally called a *dow*, used by the Arabs for commerce in the Indian Ocean; varying from 200 to 250 tons burthen.

BAGGESEN, *bâg'ĕ-sĕn*, JENS: well-known Danish poet, having a place also in German literature: 1764, Feb. 17—1826, Oct. 3; b. Korsör, in the island of Zealand. He obtained reputation first by his *Comic Tales* (1785), the opera *Holger Danske* (1790), and by his odes and songs. In 1811, he was appointed prof. of Danish language and literature at Kiel; in 1814, he removed to Copenhagen, where he became involved in an unseemly strife with Oehlenschläger, and in 1820 he left his native country altogether. Some years later, a homesickness seized him, and he set out on his return, but died at Hamburg. B.'s nature was a curious compound of pride and humility, love and hate, sen-

sitiveness and reflective power, free-thinking and faith; and these conflicting qualities appear in his poems. In 1806, he published an idyllic epic, entitled *Parthenais oder Alpenreise*, in twelve cantos, written in hexameters, which contains single passages of great beauty. B. had no lyrical talent, and only a few of his songs show simplicity, tenderness, and originality. Klopstock was his model. His best sphere was the serio-comic. His 'humorous epic' (as he called it) of *Adam and Eve*, pub. shortly after his death, is a singular mixture of humor, pathos, levity, and earnestness.

BAGLEY, WERTH: an Amer. naval officer, b. in Raleigh, N. C., 1874; graduated at the U. S. Naval Academy 1895; appointed executive officer of the torpedo-boat *Winslow* 1897. On May 11, 1898, the *Winslow* and two other vessels attempted to force an entrance into Cardenas harbor, Cuba. A shell from a Spanish gunboat killed Ens. Bagley, who was the first Amer. naval officer to fall in the war with Spain.

BAGLIVI, *bâl-yē'vē*, GEORGE: celebrated Italian physician: 1669, Sep.—1706; b. Ragusa; descendant of an Armenian family; named from his adoptive father, a wealthy physician of Lucca. He studied at Salerno, Padua, Bologna, and at Rome, where he enjoyed the anatomical prelections of his friend Malpighi, and was soon appointed prof. of anatomy at the college of La Sapienza, Rome, where he died. His great discovery in medical science is the system of 'solidism,' as it is called. Previous to the time of B., physicians had held the doctrine of Hippocrates in reference to the primary seat of diseases—viz., that it is in the fluids. B. adopted the theory, since prevalent though with admitted exceptions, that the real seat of disease is in the solids.

BAGNA-CAVALLO, *bân'yâ-kâ-vâl'lo:* inland town of Italy, formerly belonging to the Papal States; 11 m. w. from Ravenna, in the province of Ravenna. B. was a Roman city, called Tiberiacum, in honor of Tiberius. Pop. abt. 3,900.

BAGNARA, *bân-yâ'râ:* seaport town of s. Italy; on the gulf of Gioja, 16 m. n.e. of Reggio. Excellent wine is produced in the neighborhood. Pop. 7,000.

BAGNÈRES DE BIGORRE, *bân-yair' dėh bē-gōr':* town in the dept. of the High Pyrenees, France; on the Adour, at the base of Montalivet, and at the entrance to the romantic valley of Campan. Besides its extensive bathing-houses, it has a college, a theatre, a Pyrenean museum, and a trades-hall. By the Romans it was known as *Vicus Aquensis*, or *Aquæ Bigerrorum*. It was destroyed by the Goths, but the fame of its waters survived, and is now so great that it is visited by about 20,000 strangers yearly. The tepid, warm, and hot saline springs are numerous, and are recommended for cutaneous and nervous diseases. Woolens, linens, and barèges are manufactured here. Pop. 6,907.

BAGNÈRES DE LUCHON—*lü-shōn'*, *Aquæ Convenarum* of the Romans: town in the Pyrenees, France; dept. of Upper Garonne; in a pleasant valley watered by the Pique. Its cold, tepid, and hot sulphurous waters are recommended in rheumatism, gout, cutaneous diseases, and paralysis. Pop. 4,200.

BAGNI DI LUCCA: *bân'yē dē lôk'kâ* [*Baths of Lucca*]: large inland village of Italy, province of Lucca; 13 m. n. from the city of Lucca; one of the most frequented bathing-places in Italy. It is in one of the finest valleys of Tuscany, the valley of the river Lima, a branch of the Serchio. There are hot springs of various temperature from 96° to 136° Fahr., scattered over a limited neighborhood. Pop. of commune, abt. 8,200

BAGNIO, n. *băn'yō* [It. *bagno*, a bath—from L. *balnĕŭm*]: a bath; a prison; a brothel.

BAGNO A RIPOLI, *bân'yō â rē'pō-lē:* famous Italian bathing-place, in the province and circle of Florence, five m. e.n.e. from the city of Florence.

BAGNO IN ROMAGNO, *ro-mân'yō:* town of Italy, province of Florence; 35 m. e. by n. from Florence city; on the right bank of the Savio, not far from its source. It is a much frequented bathing-place, having hot springs of temperature 108°–110° Fahr.

BAGNOLISTS, n. pl. *băg'nŏ-lists*, Bagnolensians, *băg-nŏ-lĕn'shănz*, or Baiolensians, *bā-ŏ-lĕn'sĭ-ănz* [*Bagnoles*, a town in Provence]: a Christian sect in the 12th c.; belonging to the branch of the Cathari, whose great principle was to admit only a single First Cause. They were one of the bodies termed *Albigenses*.

BAGNOLO, *bân-yō'lō:* town of Piedmont, province of Cuneo; 12 m. n.w. from Saluzzo, on the left bank of the Grana, at the foot of the Alps.

Another small town near Brescia bears this name; also a town in the province of Reggio, in Emilia; and a town of the province of Lecce, in south Italy; besides many villages in Italy.

BAGOAS, n. *ba-gō'ăs* [Gr. *Bagoas*—from a Per. proper name believed to signify a eunich]: genus of beetles of the family *Curculionidæ*, or Weevils. They are small insects found in marshes.

BAG'PIPES, n. *băg'pīps* [*bag*, and *pipe*]: a musical wind-instrument which until the 18th c., was common in almost every country in Europe, and continues in use among the country people in Poland, Italy, Sicily, the s. of France, Scotland, etc.: but lacking refinement of tone and range of notes, it has fallen into disuse. Bagpiper, n. one who plays the bagpipe. The bag of the B. is of leather; the player inflates it by blowing with his mouth through a tube. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag; the wind being forced out by pressing the bag under the arm. One of the pipes, the *chanter*, is a kind of oboe with eight holes, and is similarly

handled; the others, called *drones*, sound each only one continuous low note. It is certain that the bagpipe was in use among the Hebrews and Greeks, and there are plenty of proofs that in Germany and elsewhere in Europe it was a favorite in the 15th c.

The B. is still popular in the Highlands of Scotland; and wherever there are gatherings of Highlanders, and even of Lowland Scotch, in England and other countries. Pipers in proper costume are also attached to the Highland regiments, and in some instances pipers are retained by Scottish noblemen to play on festive occasions. Skill in playing the B. is promoted by various Highland societies, which, at periodical competitions, give prizes to the best players of pibrochs (q. v.), reels, and other airs.

To BAGPIPE THE MIZZEN: to lay the mizzen aback by bringing it to the mizzen shrouds.

BAGRATION, *ba-grā'shūn*, or *bâ-grâ'te-ōn'*, PETER, Prince: 1756–1812, Oct. 7: distinguished Russian general, descended from the noble family of the Bagradites of Georgia and Armenia. He entered the Russian service 1783, and was trained under Suwarrow. In 1788 he was engaged at the storming of Oczakow; fought 1792, 1794 against the Poles; 1799 in Italy and Switzerland; and distinguished himself in the Austro-Russian war of 1805 against the French, especially in the sanguinary engagement of Nov. 16 of that year, when with a small body of troops, he bravely stood during six hours opposed to the superior forces under Murat, and thus enabled the Russian general, Kutusow, to reach Znaym with the main army. Subsequently, Prince B. was in the battles of Austerlitz, Eylau, and Friedland, and in the Russian campaign against the Turks, especially in the battle of Silistria, 1809. In the campaign of 1812, he commanded the second Russian army of the west, and had the misfortune to fail in his attack on Davoust near Mohilew; but succeeded in forming a junction with the west army at Smolensk. He was mortally wounded in the battle of Mosaisk.

BAGRATIONITE, n. *ba-grā-tĭ-on'īt* [after *Bagraiton*, its discoverer]: a mineral which occurs in black crystals in the Ural Mountains. Dana makes it a distinct variety of Allanite. Hermann described a B. which is epidote.

BAGRUS, n. *bâ'grŭs* [L. *bagrus*]: genus of fishes of the order *Malacopterygii Abdominales*, and family *Siluridæ*.

BAH, int. *bâ:* an exclamation expressive of disgust or contempt, or both.

BAHAMAS, *ba-hā'maz*, or LUCAYOS, *lô-kī'ōs:* chain of islands stretching n.w. from the neighborhood of the n. coast of Hayti to that of the e. coast of Florida. From Florida they are separated by the channel through which flows the Gulf Stream (q. v.), and from Cuba, by the Old Bahama Channel. These are the principal passages between the open ocean and the Gulf of Mexico. The chain extends in n. lat. from 20° 56′ to 27° 31′, and in w. long. from 72° 40′ to 79° 5′, having an entire length from n.w. to

s.e. of about 550 m.; and it rests mainly on two shoals—the Great Bank to the s. and the Little Bank to the n. There are upwards of 3,000 islands and rocks, but only about 30 of any size. The chief members of the group, reckoned from the n.w., are these: Great Bahama; Abaco; Eleuthera; New Providence; Andros; Guanahani, or Cat Island, or San Salvador; Watling's Island; Exuma; Long Island; Crooked Islands; Maricuana; Inagua; Little Inagua; Caicos; Turk's Island.

The revenue of the B., 1901–2, was $388,900; expenditure $405,675; imports $1,623,600; exports $884,420; total trade $2,508,020 excluding precious metals. The islands generally are of reef-like shape, long, narrow, and low. With very little appearance of soil, they derive considerable fertility from the tendency of the porous rock to retain moisture. Besides excellent pasturage, they yield guinea-corn, maize, cotton, pine-apples, lemons, oranges, pimento, and a species of cinnamon. In the larger islands, too, there is excellent timber. Cotton cultivation received a great impulse during the American civil war. During the summer, the temperature ranges from 73° to 93° F.; but in the winter the climate is delightfully temperate and considered helpful for pulmonary complaints. The annual fall of rain is from 43 to 45 inches, being heaviest in Oct., Nov., and Dec., but equally distributed over the other months. A furious and most destructive cyclone visited the Bahamas, 1866, Oct. 1.

The B. were Columbus's earliest discovery. But the precise spot of his first landing has not been ascertained. Guanahani or Cat Island has generally been believed to be the San Salvador of Columbus; but recent investigations appear to have transferred the honor to Watling's Island, situated a little further to the e. The B. having been, depopulated, but not again colonized, by the Spaniards, were occupied by the English, 1629—to whom, after various vicissitudes of fortune in the wars with Spain and France, they were ultimately secured by the treaty of 1783. Nassau, in New Providence, is the seat of government, and has recently been greatly improved both as town and port. During the American civil war, Hassau became the station for vessels about to run the blockade of the southern ports, and thence derived unexampled prosperity; and so far as agriculture is concerned, the impulse then received has been maintained by the Bahamas. The area is 5,390 sq. m.; pop. (1901) 53,735. The pop. of Turk's Island, officially separate from the B., is about 4,800.

BAHAR, n. *ba-hâr'*, or BARRE, *bâr* [Arab. *bahar*—from *bahara*, to charge with a load]: two weights current in parts of the East Indies. The *Great Bahar* is 524 lbs. 9 oz. avoir., for weighing pepper, cloves, nutmegs, etc.; the *Little Bahar* weighs 437 lbs. 9 oz. avoir., for weighing quicksilver, vermilion, ivory, silk, etc.

BAHAR, *ba-hâr'* (also spelt *Behar* and *Bihar*): one of the old Mohammedan provinces of India, occupying part of the valley of the Ganges; named after its chief town (q. v.):

a section of Lower Bengal, comprising the two divisions or Patna and Bhagulpore, and these subdivided into 12 administrative districts: 44,139 sq. m. The name B. was formerly given to one of the districts, now officially called Gayah. (*Cooch Bahar* is a native state near Bhotan; 1,307 sq. m.; pop. 602.604. Its cap. is also Cooch B., or Kuch B.) Roads and bridges can neither be well made nor maintained where, during nearly half the year, the surface of the country is inundated, and torn by innumerable torrents. In the dry season, the beds of the rivers present only detached pools. Among the minerals, the most important are coal and mica. The latter, nearly as pellucid as glass, is sometimes found in blocks, yielding plates of 36 inches by 18. Potatoes, cabbages, cauliflower, lettuces, turnips, etc., have been introduced from Europe, and thrive. Of indigenous productions, the most considerable are rice, pulse, sugar, cotton, indigo, and tobacco. The district is largely engaged in the manufacturing of muslins, silks, carpets, blankets, tents, tapes, threads, ropes, paper, glass, cutlery, jewelry, leather, ink, soap, and pottery. Ardent spirits, too, are extensively distilled from the flowers of the *Bassia latifolia* (q. v.). Before the days even of Moslem domination, B. appears to have been the centre of a Hindu empire, which native accounts describe as of matchless splendor, and of fabulous duration. Pop. (1901) 24,241, 305.

BAHAR, or Behar, *ba-hâr:* town of Bengal, 34 m. s.e. by s. from Patna: chief town of a British dist. of the same name (q. v.). The original city is nearly deserted, and the present town consists of houses scattered about its remains, and interspersed with fields, gardens, and groves. There are some remains of fine mosques. The ruin of the ancient town began with its sack by the Mahrattas about 1742, and was completed by famine some years later. Pop. about 45,000

BAHIA, *bâ-ē'â:* cap. of the Brazilian province of the same name; otherwise called San Salvador—the more usual term being taken from *Bahia de Todos-os-Santos,* or *Bay of All Saints,* on which it is situated; lat. 13° 1′ s., long. 38° 32′ w. B. has an exchange, arsenal, and imperial dock-yard, besides many ecclesiastical and public institutions; and is the point of departure for a railway line. It is connected by submarine telegraph with Pernambuco, Para, and Rio. The chief exports of B. are sugar, cotton, coffee, tobacco, rice, rum, dye-stuffs, fancy woods, cocoa-nuts, horns, hides, diamonds, and bullion; and it imports manufactured goods, provisions, flour, salt, iron, glass, and wines. B. is the oldest city in Brazil, having been founded by the first cap. gen. of the country, and was long the cap. of the colony. As a port, B. is unsurpassed. Pop. over 200,000, nearly equally divided into whites, blacks, and mulattoes.

BAHIA: province of Brazil, about the middle of the coast taking its name from its chief city: s. lat. from 10° to 16° w. long. from 37° to 44°. The wealth of B., consisting in valuable timber, in rich mines of gold, silver,

copper, lead, iron, in deposits of potash, alum, etc., is in great measure, lost for want of good roads. The interior contains lofty sierras; but the maritime districts are fertile, being well watered by the Itapicuru, Contas, and other rivers. Besides the streams that flow through B., the San Francisco, a vastly larger river, forms about half of the inland boundary, dividing this province from that of Pernambuco. Pop. 1,821,089.

BAHIA HONDA, *bâ-ē'â ōn-dâ*: a harbor on the n. coast of Cuba, 60 m. w.s.w. of Havana; protected by a fort, and formerly much resorted to by privateers and slavers.

BAHNASA, *bâ-nâ'să* or BEHNESEH, *bĕ-nĕ'sĕ:* town of central Egypt, on the Bahr Yousef (Joseph's Canal); noteworthy as the site of the ancient *Oxyrynchus*, celebrated for its numerous monasteries, the ruins of which are still seen.

BAHR, *bâr:* Arabic word signifying a large body of water applied to lakes and rivers—BAHR-EL-ABIAD (the White river) and BAHR-EL-AZRAK (the Blue river) are the chief branches of the Nile (q. v.).—BAHR-ASSAL is Lake Assal (q. v.).—BAHR-BELA-MA (the Sea without Water), a long deep valley in the desert, west from Cairo. It is completely barren, but has the appearance of having been once a watercourse.

BÄHR, *bâr*, JOHANN CHRISTIAN FELIX: eminent German philologer and critic: 1798–1872, Nov. 27; d. Darmstadt. He was educated at Heidelberg, where he gained the friendship of Creuzer, whose symbolic system of interpretation in mythological matters he pursued at a later period. He was elected a professor in 1826, having published an annotated edition of *Alcibiades* (Heid. 1822), and of *Philopoemen, Flaminius, Pyrrhus* (Leip. 1826); also the fragments of Ctesias. But a greater interest was excited by his *History of Roman Literature* (1828), noted for clearness and comprehensiveness. Three supplements to this work appeared: *The Christian Poets and Historians of Rome* (1836), *The Christian-Roman Theology* (1837), and the *History of Roman Literature in the Carlovingian Period* (1840). One of his most important works is his version of Herodotus (1832–35). In 1835, he published his *De Universitate Constantinopoli Quinto Sæculo Conditâ*. He contributed numerous articles to Jahn's *Jahrbücher für Philologie*, and other works.

BAHRDT, *bârt*, KARL FRIEDRICH: a German theologian of the extreme sceptical school: 1741–92, Apr. 23; b. Bischofswerda, Saxony; d. Halle. He studied at Leipsic, where he showed extraordinary talents, and a restless disposition. His early theological writings indicated his sceptical tendencies. On account of his immoral conduct, he was, 1768, compelled to leave Leipsic, where he had been a popular preacher. In Erfurt, his next residence, he was appointed prof. of philosophy and Hebrew antiquities, and wrote *Letters on a Systematic Theology*, and *Aspirations of a Mute Patriot*, two works whose heterodoxy

involved him in controversies, and made his position untenable. In 1771 he went to Giessen, where he delivered theological lectures, and preached with approbation. His translation of the New Test. was regarded as so dangerous, that the author was deprived of the privilege of teaching. His creed, in fact, was simple Deism, rejecting miracles and not maintaining the immortality of the soul. Ultimately, he was reduced to the position of a tavern-keeper; and as he still persevered in his attacks on orthodoxy, he was imprisoned for one year at Magdeburg, where he wrote an autobiography. Among his works are —*The Religious Edict* (a satire on the Prussian religious edict of 1788), and *The German Union.*

BAHREIN ISLANDS, *bâ-rān'*, or AVÂL ISLANDS: group of islands in the Persian Gulf. The most important is Bahrein, or Avâl, about 27 m. long, 10 broad; hilly in the centre, but fertile, producing dates, figs, and other eastern fruit, besides wheat and barley. Bahrein is badly cultivated. Spring-water is plentiful in the interior, but on the coast it can be procured only from the bottom of the sea, where it springs quite fresh, and is brought up by divers in skins. Manama, the cap., lat. 26° 12′ n., long. 50° 39′ e., has a good harbor on the n., and a safer, though smaller one on the s. The Bahrein Islands are remarkable chiefly for their pearl fisheries, known in ancient times, which employ, during the season, from 2,000 to 3,000 boats, each manned with from 8 to 20 men. The annual value of the pearls is estimated at from $1,000,000 –$1,500,000. Tortoise-shell, shark-fins, and dates are articles of export. The islands, which have been subject to many political changes, are now inhabited by Arabs. Pop. 68,000.

BAIÆ, *bâ'yē:* small town of antiquity, on the coast of Campania, 10 m. w. of Naples, where the present castle of Baja stands. When the Roman empire was in its greatest splendor, the beauty of the situation and scenery, and the excellence of the mineral springs of B. made it such a favorite resort of the Roman nobles, that for want of space for their baths and villas they encroached on the sea. Julius Cæsar, Piso, Pompey, Marius, Julia Mammæa, and others, had country-houses at Baiæ. Horace preferred B to all other places in the world. Seneca warned every one who desired to maintain dominion over his passions, to avoid this watering-place. Cicero thought it necessary to excuse himself for undertaking the defense of Marcus Cœlius, a man who had often visited B, for B. was considered by the stricter moralists of those times the abode of voluptuousness and luxury, and a den of vice. The ruins, still standing on the desolate coast, or rising from the sea, are now the only evidence of the former magnificence of B. The ruins of three supposed temples—one of Venus, one of Mercury, and one of Diana Lucifera—as well as the remains of a few *thermæ*, or warm baths, still attract the attention of archæologists. The harbor, one of the largest belonging to the Romans, is now nearly

destroyed. The surrounding country is covered with the ruins of Roman villas, sepulchral monuments, and other buildings. Pop., dwelling in mean hovels, 800.

BAIERITE, n. *bī'ĕr-īt*, or BAIERINE, *bī'ĕr-īn* [*Bayern*, or *Bairen*, the German name of Bavaria]: a mineral, the same as Columbite.

BAIKAL, *bī'kâl* [in Turkish, Bei-kul, i.e. Rich Lake]. after the Caspian Sea and the Sea of Aral, the largest lake of Asia. It is a fresh-water lake, in the s. of Siberia, in the govt. of Irkutsk, near the great military road between Moscow, Kiachta, and the mines of Nertschinsk: lat. 51° 20′ to 55° 30′ n., long. 103° to 110° e. It somewhat resembles a sickle in shape, and varies considerably in breadth. Between the mouths of the Selenga and the Buguldeicha, it is only 19 m. across. Its length is 387 m. and its breadth 9¼ to 50 m.; height above the sea, 1,338 ft.; depth at s.w. end, 682 fathoms. The Baikal Mountains, a spur of the Altaï, enclose the lake, which is fed by numerous streams, the chief of which are the Selenga and Bargusin. Its outlet is by the Lower Angara, a chief tributary of the Yenisei; but the river is inconsiderable in size compared with those which flow into the lake. It has several islands, the largest of which, Olkon, has a length of 32 m. B., which forms an important link in the chain of communication between Russia and China, has two commercial ports, and since 1846, steamboats have given considerable impetus to its trade. Its sturgeon and seal fisheries are valuable, and large quantities of a fish resembling a herring are caught in it. A peculiar fish, called the golomynka (*Callionymus Baicalensis*), almost one mass of fat, yielding fine train-oil, was formerly caught in immense numbers, but is now scarce. The surface of the lake is frozen from Nov. to Apr., but traffic is carried on over the ice. Besides the Russians settled on the banks of the Selenga and Angara, the shores of Lake B. are inhabited by tribes of the Burates and Tunguses.

BAIKALITE, n. *bā'kăl-īt:* a dingy, green crystalline variety of sahlite, found at the mouth of one of the rivers that fall into Lake Baikal, Siberia. BAIKERITE, n. *bā'kĕr-īt*, a chocolate-brown-colored mineral wax.

BAIL, v. *bāl* [OF. *bailler*, to keep in custody—from L. *bājŭlārĕ*, to bear a burden: F. *bail*, a giving over, a granting: It. *balia*, power—from L. *ba'jŭlus*, a bearer, generally with authority]: to release from a burden or imprisonment; to set free; to liberate on the security of another; to lave out or free from water (see BALE 2): N. surety for another. BAIL'ING, imp. BAILED, pp. *bāld*. BAILABLE, a. *bāl'ă'-bl*, that may be bailed. BAIL'BOND, n. a written security given for the appearance of a prisoner to take his trial. BAIL'PIECE, n. the slip of parchment on which are recorded the obligations under which those bailing an accused person come before he is surrendered to their custody. BAIL'MENT, n. delivery of goods in trust. BAILEE, n. *bāl-ē'*, he to whom goods are delivered in trust or on bail.

BAIL'ER, or BAIL'OR, n. one who entrusts another with goods for a specific purpose.

BAIL, n. *bāl* [Dutch *bailie*, a bar, a tub]: the handle of a kettle or a similar vessel; a certain limit within a forest; a division between the stalls of a stable; *pl.*, hoops to bear up the tilt of a boat.

BAIL: a technical term in the practice of the law. By B. is understood the security offered by sufficient sureties and officially accepted for the appearance in court on a day, and at a place certain, of a person arrested or imprisoned, and who, in consequence of such security or B., is in the mean time set at liberty. One who gives security for another is also known as his B. Such security involves the assumption of the custody of the arrested or imprisoned party by his B., the meaning of the rule being that the party arrested or imprisoned is delivered into the hands of those who bind themselves for his forthcoming, in order that he may be protected from prison until he has to make his personal appearance; and, in this sense it differed from the old term, *mainprize*, now obsolete, and which signified a mere security without any other or corresponding guarantee, as in the case of bail. A technical and necessary distinction is taken in law-books between what is called *common B.* or *B. to render to prison*, and *special B.*, or *B. to the action.*

As to those who may or may not be B., it appears, from the nature of the security undertaken, that persons privileged from arrest cannot be B., because the engagement on the part of the B. being, in default of the principal party, to pay the debt or damages and costs, the plaintiff is entitled to require the security of persons who are amenable to the ordinary process of the courts. The possession of *leasehold* property is not enough, unless the party is also a housekeeper; but the real owner of a *freehold* estate, however small it may be, within the jurisdiction of the court, provided he can otherwise make up the amount required, is qualified, though he be only a lodger, or merely an occupant by sufferance in the house of another.

B. in Error: it is provided that proceedings in error shall not stay or delay execution on a judgment, unless the person alleging or pleading such error shall be bound, along with two sufficient sureties, in double the sum recovered by the judgment, in order to prosecute the proceedings in error with effect, and make payment of the costs, in the event of the judgment being affirmed, or the proceedings in error being discontinued. *B. in Attachment*, signifies the sureties required for a party arrested upon a writ of attachment, and brought up before a judge in order to obtain his discharge from custody, the sureties undertaking that he shall appear and answer such interrogatories as may be required of him.

In criminal procedure, it is provided that if the justice or justices, before whom a prisoner is brought, shall be of opinion that the evidence against the prisoner be sufficient, or even if it raise a strong or probable presumption of his

guilt, they shall either commit him to prison, or admit him to B.—that is, allow him to be discharged on entering into a recognizance—with some sufficient surety or sureties—to appear and surrender himself to custody, to take his trial on such indictment as may be found against him, in respect of the charge in question. In all cases of arrest in civil action, B. may be given. In criminal action, the acceptance or the rejection of B., even in cases of high crime, is left largely to the discretion of the court.

In the *civil* process of the Scotch courts, the term corresponding to B. is CAUTION (q. v.).

BAILEN, or BAYLEN, *bī-lĕn′:* town Spain, 24 m. n.n.e. of Jaen. It corresponds to anc. Bæcula, where Scipio won victories over Hasdrubal, Mago, and Masinissa, B.C. 209 and 206. Here in 1212 was the great battle of Navas de Tolosa, where Alfonso VIII. is said to have slain 200,000 Moors, losing but 25 Christians. 1808, July 23, the French gen. Dupont signed the capitulation of B., delivering to the Spaniards 17,000 prisoners, after a bloody conflict of several days. The town has nothing of note save the ruins of a castle. It has manufactures of linen, glass, tiles, etc. Pop. 10,041.

BAILEY, n. *bāl-* [mid. L. *baillĕŭm,* a species of rampart, a space fortified with stakes: L. *vallum,* a rampart]: the whole space enclosed within the external walls of a castle, or fortress, with the exception of that covered by the keep. This space was variously disposed of, and differed greatly in extent. Sometimes it consisted of several courts, divided from each other by embattled walls, so as to form a series of fortifications. When these courts were two in number, they were known as the outer and inner bailey. The entrance to the B. was generally by a drawbridge over the ditch, and through a strong machicolated and embattled gate. The B. was often like a village, of great extent, containing the barracks for the soldiers, lodgings for workmen and artificers, magazines, wells, chapels, and sometimes even a monastery. In towns, the B. had even a wider signification, and was often retained after the castle or keep had long disappeared, as in case of the Old B. in London, and the B. in Oxford. *Old Bailey,* a prison in London (Gael. *baile,* a town, a village], may mean simply the 'old village' or 'town.'

BAIL′EY, *bā′lĭ,* FLORENCE MERRIAM, American writer on ornithology: b. 1863, Aug. 8; educated at Smith College. Among her works are *Birds Through an Opera Glass*; *A-Birding on a Broncho*; *Birds of Village and Field*; *Handbook of Birds of Western United States* (1902); etc.

BAILEY, GAMALIEL, M.D.: 1807, Dec. 3—1859, June 5; b. Mount Holly, N. J. He studied medicine in Philadelphia, received his degree 1828, and sailed as ship's doctor to China. He began his work as a journalist with the *Methodist Protestant,* Baltimore; but 1831 removed to Cincinnati, serving as hospital doctor during the cholera season. In 1836, with James G. Birney, he established the Cincinnati *Philanthropist,* an anti-slavery journal,

becoming sole editor 1837. His office was thrice sacked by a mob in 1837–41, but he issued the paper till 1844, when he went to Washington, D. C., to direct the publication of the *National Era*, in which *Uncle Tom's Cabin* originally appeared. He died at sea, on a voyage to Europe for health.

BAILEY, Jacob Whitman: 1811, Apr. 29—1857, Feb. 26; b. Ward (Auburn), Mass. After attending the common schools at Providence, R. I., he studied at West Point, graduating 1832. Being appointed lieut. of artillery, he served in S. C. and Va. He was asst., acting, and full prof. of chemistry, mineralogy, and geology at West Point from 1834 till his death. His scientific reputation rests mainly on his researches in microscopy, in which investigation he is the pioneer in the United States. He was a member of many scientific associations in the United States and England. He died at West Point.

BAILEY, James Montgomery: author: b. Albany, N. Y., 1841, Sep. 25; d. 1894, Mar 4. He was educated at the common schools, and in early life was a carpenter, working at his trade in Danbury, Conn., 1860. At the outbreak of the civil war, he enlisted in the 17th Conn. regt., and served till the close of the war. Having been an occasional contributor to the newspapers, he purchased in 1865 the *Danbury Times*, and ran it until 1870, when he consolidated it with the *Jeffersonian*, under the name of *The Danbury News*. In this paper he made his reputation as 'the *Danbury News* Man,' through his humorous ability in writing short descriptive articles, which became very popular and were copied extensively into the newspapers through the United States. His published works include: *Life in Danbury* (1873); *The Danbury News Man's Almanac; England from a Back Window* (1878); *They All Do It* (1877); *Mr. Phillips's Goneness* (1879); and *The Danbury Boom* (1880).

BAILEY, Joseph: farmer and soldier: 1827, Apr. 28—1867, Mar. 21; b. Salem, O. He served as capt. in the expedition against New Orleans 1862, and was promoted to major and lieut.col. 1863. In 1864 his remarkable engineering feat of building a dam in the Red River, which deepened the channel, saved the Mississippi squadron, which was shut up by low water. He was appointed brig.-gen., and after the war settled in Newton co., Me., as a farmer, was elected sheriff, and was murdered while performing an official duty.

BAILEY, Joseph Weldon, United States senator for Texas: b. Copish County, Mo., 1863, Oct. 6. He studied for the legal profession, graduated as a lawyer in 1883, and, entering politics, in 1884 served as a district elector on the Cleveland and Hendricks ticket. The following year he removed to Gainesville, Texas, and in 1888 served as elector for the State at large on the Democratic ticket. He was elected to the Fifty-second, Fifty-third, Fifty-

fourth, Fifty-fifth, and Fifty-sixth Congresses, and was the Democratic nominee for speaker of the House of Representatives on the organization of the Fifty-fifth Congress, 1897, March 15. He was chosen to succeed the Hon. Horace Chilton as United States senator for Texas, 1901, Jan. 23, and was re-elected 1907, Jan. 22.

BAIL'EY, Liberty Hyde, American horticulturist; b. South Haven, Mich., 1858, March 15, graduated at the Michigan Agricultural College in 1882; was associate to Dr. Asa Gray at Harvard University in 1882–3; professor of horticulture and landscape gardening in the Michigan Agricultural College in 1883–8; in the last year became professor of horticulture in Cornell University; and in 1903 was appointed director of the College of Agriculture at Cornell. He has contributed much to both the science and the practice of horticulture and has also done important educational work at Cornell. He was an associate editor of the revised edition of *Johnson's Universal Cyclopædia* (1892–6), and editor of *American Gardening*. He published a large number of technical works, including *Annals of Horticulture, Evolution of Our Native Fruits, Principles of Fruit Growing, Text-book of Agriculture, Nature Study Idea, Cyclopædia of American Horticulture.*

BAIL'EY, Loring Woart, chemist and geologist: b. West Point, N. Y. 1839, Sept. 28. He graduated at Harvard in 1859, and in 1861 was appointed professor of chemistry and natural history in the University of New Brunswick, Fredericton, N. B., since which date he has also been connected with the geological survey of Canada. Besides his official reports he has published: *New Species of Microscopical Organism from the Para River, South America* (1861); *Mines and Minerals of New Brunswick* (1864); *Geology of Southern New Brunswick* (1865); *Elementary Natural History* (1887).

BAI'LEY (or Baily), Nathanael, or Nathan: eminent English philologist and lexicographer: died 1742. His *Etymological English Dictionary*, pub. about 1721, was the foundation of Johnson's great work, and is still worthy of consultation. B. had a school at Stepney, near London, and published several educational works.

BAILEY, Philip James: distinguished English poet: b. Basford, in the vicinity of Nottingham, 1816, Apr. 22; d. 1902, Sept. 6. He entered the Univ. of Glasgow, 1831, and was called to the English bar 1840, but never practiced. The first edition of *Festus*, the poem by which he is best known, published 1839, in subsequent editions received much new matter. It attracted considerable notice in England and America. While the enthusiasm lasted, B. was in certain quarters mentioned in the same breath with Shakespeare, Milton, and Goethe. By reason of this injudicious admiration, more injurious than even unmerited censure, writers in literary journals have frequently been stirred up to speak of *Festus* with a contempt which it is far from deserving. It is a wonderful

work, when the age of its author is taken into account. It was begun before the author had reached his 20th year, and completed in three years. *Festus* errs from excess of boldness. Mr. B. speaks of universes as other poets speak of buttercups. He had the *entrée* to the highest heaven and to the regions of penal fire. He is on terms of perfect familiarity with Eternity. He laid his scenes in the 'Centre,' 'Elsewhere,' 'Everywhere,' 'Nowhere.' Despite its extravagance, *Festus* is full of poetical thought and felicitous expression, and has occasional dashes of grim humor, not unworthy of Goethe's mocking fiend himself. The faults of the poem are as great as the beauties; there is total lack of congruity or proportion; the reader lays it down with an admiration qualified with disgust. In 1850, Mr. B. published the *Angel World*, with all the faults and all the beauties of the former work on a reduced scale: it is now incorporated with the larger work. Mr. B's subsequent writings were the *Mystic*, the *Age*, a colloquial satire, and the *Universal Hymn* (1867). The first production is in the writer's early style, with all the beauties deleted.

BAILEY, Samuel: 1791–1870, Jan. 18; b. Sheffield, Eng.; writer on politics, political economy, mental philosophy, and other subjects. He became a banker in his native town, and at his death left £90,000 as a bequest to the town. His works are: *Essays on the Pursuit of Truth and on the Progress of Knowledge* (1821); *Questions for Discussion in Politics, Political Economy, and other Departments of Knowledge* (1823); *A Critical Dissertation on the Nature, Measures, and Causes of Value* (1825); *A Letter to a Political Economist, occasioned by an Article in the Westminster Review on the Subject of Value* (1826); *Essays on the Formation and Publication of Opinions* (1829)—a sequel to his work on the *Pursuit of Truth; A Discussion of Parliamentary Reform* (1831); *The Rationale of Political Representation* (1835); *The Right of Primogeniture Examined* (1837); *Money and its Vicissitudes in Value* (1837); *A Defense of Joint-stock Banks and Country Issues* (1840); *A Review of Berkeley's Theory of Vision* (1842); *A Letter to a Philosopher in Reply to some Recent Attempts to vindicate Berkeley's Theory of Vision* (1843); *The Theory of Reasoning* (1851); *Discourses on Various Subjects, Literary and Philosophical* (1852); *Letters on the Philosophy of the Human Mind* (three series, 1855, '58, '63); *On the Received Text of Shakespeare's Dramatic Writings, and its Improvement* (2 vols. 1862, '66).

Mr. B.'s works on the *Pursuit of Truth* and the *Publication of Opinions* gave impetus to liberal views. His writings generally are distinguished by independent thinking, logical precision, a careful English style, and a reformatory aspiration. In mental science he was of the school of Locke; in ethics he accepted the doctrine of Utility.

BAIL'EY, Solon Irving, astronomer: b. Lisbon, N. H., 1854, Dec. 29. He graduated from Boston University 1881, and Harvard (A.M.), 1887. In 1889 he was sent to

Peru to determine the best location for a southern station of the Harvard Observatory. Arequipa was selected, an observatory was built, and, as associate professor of astronomy, Prof. Bailey has had charge of the work there for eight years. In 1893 he established a meteorological station on the summit of El Misti, by far the highest scientific station in the world. His scientific writings have been issued in the *Annals of Harvard College Observatory.*

BAI'LEY, Theodorus: 1805, Apr. 12—1877, Dec. 10; b. Chateaugay, N. Y. He entered the navy as midshipman 1818, Jan. 1, becoming lieut, 1827, March 3, commander 1849, capt. 1855, com. 1862, and rear-admiral 1866. He was engaged in the capture of slavers on the African coast 1820–1; twice sailed around the world, on the *Vincennes* 1833–36, and again on the frigate *Constellation.* He served on the w. coast of Mexico during the Mexican war, and during part of 1861–2 commanded the frigate *Colorado* of the Gulf blockading squadron. 1862, Apr. 24, as second in command of Farragut's fleet, he led the right column in the passage of Forts St. Philip and Jackson, and commanded the fleet at the capture of New Orleans, on which occasion he showed signal gallantry and ability. Admiral Farragut complimented him by detailing him to officially demand the surrender of the city of New Orleans, and by making him the bearer of dispatches to Washington announcing the victory. He was placed on the retired list 1866, Oct. 10.

BAIL'EY, Vernon, American scientist: b. Manchester, Mich., 1863, June 21, received a university education and in 1900 was chief field naturalist of the United States Biological Survey. Among his publications are *Spermophiles of Mississippi Valley, Revision of Voles of the Genus Evotomys, Mammals of District of Columbia,* etc.

BAIL'EY, William Whitney, American botanist: b. West Point, N. Y., 1843, Feb. 22. He was educated at Brown and Harvard, having been a pupil of Prof. Asa Gray. In 1867 he was botanist of the United States Geological Survey of the 40th parallel; in 1867–9 assistant librarian of the Providence Athenæum. He was appointed instructor in botany at Brown University in 1877, and became professor there in 1881. He has published *Botanical Collector's Handbook* (1881), and contributed to several periodicals.

BAILIE, or Baillie, n. *bāl'ĭ* [F. *baillie,* an ambassador: Gael. *baile,* a village, a town]: a Scotch term, with several legal applications; but chiefly and popularly signifying a superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs, the office is in some respects

analogous to that of Alderman in England. The chief magistrate of a Scotch corporation, called the *Provost* (q. v.), and often one or more of the bailies, are, in virtue of their office, in the commission of the peace; and bailies are exempted from serving on juries. There are also *Bailies of Regality* and *Barony*, appointed by the *Superior* or overlord of the manor (q.v.), with limited powers. There is a B. for the Sanctuary or Abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper, and having jurisdiction within the precincts. See ABBEY: SANCTUARY. The word B. was also formerly a term in the practice of Scotch conveyancing, signifying an officer who represented the seller; the office of B. in this sense is abolished. See BAILIFF. BAILIARY, *bāl'ĭ-a-rĭ* the extent of a bailie's jurisdiction.

BAILIFF, n. *bāl'ĭf* [OF. *baillif*—from *bailler*, to keep in custody: F. *bailli*, a bailiff. See BAIL. BAILIE in Scotch, BAILLI in French, and BALIO in Ital., are terms having a common origin—namely, the middle Latin *ballivus*, connected with the older form, *bagalus* or *bajulus*]: one intrusted to execute power on behalf of another; an officer of justice; an agent or steward over land: always an officer exercising superintendence on behalf of some superior authority. At the Greek imperial court in Constantinople, the chief tutor of the imperial children was called Bajulos. The same title seems also to have been given in Constantinople to the superintendent of the foreign merchants, who was appointed by the Venetians, and it may possibly be for this reason that the title Balio came at length to be applied also to the Venetian ambassadors themselves. The title Ballivus was introduced by the Knights of St. John into the s. and w. of Europe, as the eight members of their chapter were called *Ballivi conventuales*, whence also the name Ballei, given to the circles into which the possessions of the order were divided. In France, the royal Baillis were at one time commanders of the troops, administrators of the royal domains, and judges each in his district. In later times, the royal Baillis were deprived of the two latter offices, and were consequently then called Baillis d'Epée only. Proprietors of estates, also, possessing supreme jurisdiction, appointed Baillis to superintend these courts of justice. As very little knowledge was required for these situations, and as they might be purchased, they were held in little estimation; and in later times, the Baillis became standing characters on the stage, held up to ridicule on account of their ignorance and their absurd pretensions, as well as for cheating and injustice. In England, the name B. was introduced in the reign of William I., to designate the superintendents of counties, which were called Ballivæ. BAILIWICK, n., *bāl'ĭ-wĭk*, [F. and AS. *wic;* Goth. *veihs;*—L *vīcus*, a village or town]: the limits of a bailiff's authority or jurisdiction. Blackstone says that the word was introduced by the princes of the Norman line in imitation of the French, whose territory was divided into bailiwicks as that of England into counties.

BAILIFF, in English Law, is a legal officer; the keeper, protector, or superintendent of some duty or charge legally imposed. As officers of the law, bailiffs put in force arresting process, and they perform other duties within the county or bailiwick required of them by the sheriff, who is their immediate official superior.

The sheriff himself is the *Queen's B.*, and, as such, it is his business to preserve the rights of the Crown within his bailiwick. In the United States the term is rare, but sometimes used to signify a sheriff's officer or constable; or one accountable for rents and profits of real estate.

BAILIFF, HIGH: see HIGH BAILIFF.

BAILLEUL, *bī yū':* town of France, dept. of the Nord; with manufactures of woolens, cottons, lace, hats, beet-root sugar, etc.—the cheese of its neighborhood being also celebrated. Pop. 8,000.

BAILLIE: see BAILIE.

BAILLIE, *bā'le,* JOANNA: poetess: 1762, Sep. 11—1851 Feb. 23; b. Bothwell, Lanarkshire, Scotland; dau. of a Presbyterian clergyman. She received a superior education, and went to reside in London with her brother, Matthew; a physician. Here she remained till her death, at the age of 89. Her life was singularly happy, but devoid of striking incident. She had the esteem and affection of all her literary contemporaries, and general popular appreciation. Her greatest achievement is the *Plays on the Passions,* which, though erroneous in conception, are full of noble and impressive poetry, with frequent touches of intense dramatic power. The principle upon which Miss B. proceeded in the construction of these works, was to take a single passion as the subject of a play, and to exhibit its influence on an individual supposed to be actuated by nothing else. In fact, such persons do not exist; men are swayed by a variety of conflicting emotions; and even when any one of these becomes dominant, it does not destroy the rest, otherwise every victim of a ruling passion would lapse into a monomaniac. The leading personages of Miss B.'s plays are, therefore, rather impersonations of certain elements of human nature, than genuine human beings. They are vivid poetical studies in psychology; not mirrors held up to nature, like the brilliant and variegated creations of Shakespeare. Still, there are scenes, in her tragedies especially, where the interest of the reader is so excited by the great art shown in the minute delineation of a particular passion, that he is forced to forget the artificial theory of the authoress. The first volume of the *Plays of the Passions* appeared 1798, and had remarkable success. Four years afterwards, she published a second vol.; in 1804, *Miscellaneous Plays;* in 1812, the third vol. of her *Plays of the Passions;* in 1836, three vols. of dramatic poetry. The most popular as well as the most powerful of her separate works is the tragedy *De Montfort.* It was brought upon the stage in London, Kemble acting for eleven nights the character of the hero. Many of Miss B.'s minor pieces are very sweet, simple, and beautiful; and are marked by a sprightly grace of versification, and a playful

serenity of spirit, which reflect the personal character of the authoress.

BAILLIE, MATTHEW, M.D.: 1761, Oct. 27—1823, Sept. 23; b. in the Manse of Shotts, Lanarkshire, Scot.: distinguished physician and anatomist. His father (prof. of divinity in the Univ. of Glasgow) was descended from the family of Baillie of Jerviswood, noted in the history of Scotland during the reign of Charles II.; his mother was a sister of the two celebrated anatomists, William and John Hunter; and one of his sisters was Joanna B., the poetess. He studied in the Univ. of Glasgow, and then in Baliol Coll., Oxford; and, 1780, he commenced his anatomical studies in London under the care of his uncle. At the death of Dr. Hunter, 1783, he was made his successor in the anatomical lectureship, in which he gained high repute. In 1795, he published a small work entitled, *The Morbid Anatomy of some of the most Important Parts of the Human Body*, which as a compendium of information previously scattered, and as offering a multitude of ingenious observations on its special subject, had a remarkable influence on the study of medicine. Its publication has been said to have made an era in medical science. In 1799, Dr. B. relinquished his lectureship, and in 1800, his duties in St. George's hospital, and turned exclusively to the work of a medical practitioner. In one year his professional income is said to have reached $50,000. In 1810, he was appointed physician to the king, and offered a baronetcy, which he declined.

BAILLIE, ROBERT: one of the most eminent, and perhaps the most moderate, of all the Scottish Presbyterian clergy during the time of the civil war: 1599–1662, July; b. Glasgow: educated at the univ. of that city. In 1622, he received episcopal ordination—episcopacy being then nominally the established religion of the country—from Abp. Law, and was shortly after presented to the parish church of Kilwinning. At first a maintainer of the doctrine of passive obedience, he seems to have changed his opinions on this point during 1630–36. In 1638, he sat in that famous General Assembly of the Kirk of Scotland which met in Glasgow to protest against episcopacy being thrust on an unwilling people, but conducted himself with greater prudence and temperance than was agreeable to his excited brethren. However, he soon threw himself eagerly into the national cause. In 1640, he was selected by the Scottish leaders, on account of his pamphlet against Laud's party, as a proper person to go to London, with other commissioners, to prepare charges against Abp. Laud, whose rash and tyrannical measures were alleged to have been the origin of the recent hostilities against the sovereign. On his return to Scotland, 1642, he was appointed joint prof. of divinity at Glasgow, with Mr David Dickson, equally distinguished, but less moderate. In 1643, he was again sent to London as a delegate to the Westminster Assembly of Divines. It is curious to notice, in connection with this incident of his career, that though Mr B. had himself ex-

perienced the injustice of intolerance, like almost every other theologian of his age, he vehemently discarded the principle of toleration, and asserted the divine right of presbytery with as much emphasis as Laud did the divine right of episcopacy. After the execution of Charles I., 1649, B. was chosen by the church to proceed to Holland, and to invite Charles II. to accept the covenant and crown of Scotland. After the Restoration, he was made principal of Glasgow Univ. His *Letters and Journals*, from 1637–62, were edited by David Laing for the Bannatyne Club (3 vols. 1841,2) and formed the subject of a remarkable review by Carlyle, reprinted in his *Miscellanies*.

BAILLIE, Robert, of Jerviswood, happily described as the 'Scottish Sydney': b. Lanarkshire; d. 1684, Dec. 24: distinguished himself during the latter part of the reign of Charles II. by his bold opposition to the tyrannical misgovernment of the Duke of Lauderdale. Having on a certain occasion (1676, June) rescued a relative, the Rev. Mr. Kirkton, from the clutches of Abp. Sharpe's principal informer—a wretched profligate of the name of Carstairs, who pretended that he had a warrant for the apprehension of the clergyman, but refused to show it—B. was actually prosecuted for interfering to prevent the illegal capture of his friend. For this purpose, an ante-dated warrant was furnished to Carstairs, signed by nine of the councilors. The Marquis of Athole afterwards admitted to Bp. Burnet that he was one of the nine who lent their names to this infamous document. The case was therefore made out to be a tumult against the government. B. was fined in 6,000 merks (£318). He refused to pay, and was sent to prison; but so strong was the indignation of the Scottish gentry, that he was released at the end of four months, in consideration of payment of one-half of his fine to Carstairs. In 1683, B. was prominent in a scheme of emigration to South Carolina, as he saw no other refuge from the degrading tyranny of the government. About the same time, however, he entered into correspondence with the heads of the new Puritan party in London, whose leaders were Russell, Sydney, and the Duke of Monmouth, and subsequently went to that city to concert measures for a vigorous insurrection against the government, not, however, so far as he was concerned, with a view to revolution, but as the only means of securing adequate reforms On the discovery of the Ryehouse plot, B. was arrested, and sent down to Scotland. Accused of conspiring against the king's life, and of being hostile to monarchical government, B. was tried at Edinburgh, and condemned to death upon evidence at once insignificant and illegal. His bearring both on his trial and during his imprisonment was such that his cousin, Bishop Burnet, declared 'it looked like a reviving of the spirit of the noblest of the old Greeks or Romans, or rather of the primitive Christians and first martyrs', and the celebrated Dr. Owen speaks of him as a 'great spirit,' 'a person of the greatest abilities I almost ever met with.' The sentence was carried into execution 1684, Dec. 24.

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